

SECTION VI

CASE STUDIES

Written by

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Project Director**

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PROTECTIVE GLAZING CASE STUDY #1

Berry Memorial United Methodist Church (1909), Chicago, Illinois

WINDOW: Opalescent art glass & painted glass (1909)

WINDOW ORIENTATION: South

WINDOW VALUE: Moderate

VANDALISM/SECURITY RISK: High

YEAR PG WAS INSTALLED: 1970s

PG SQUARE FOOTAGE: 125

PG COST OF INSTALLATION: Unknown

PG COST PER SQUARE FOOT: Unknown

PG MATERIALS: Plastic sheets & aluminum channels

PG INSTALLATION REASONS: Although the church does not have any records as to why the PG was installed, the windows were probably covered due to general concerns regarding energy and glass protection.

PG INSTALLATION METHOD: The PG was installed in large sheets over the wood window frame and screwed into the outer molding around the perimeter. An aluminum grid subframe with snap-in stops was screwed into the window frame and sill for additional support and caulked with silicone. The PG created a deep 4½" airspace around most of the window, while hopper ventilators were piggybacked (flush) so that they could continue to operate.

WINDOW CONDITIONS:

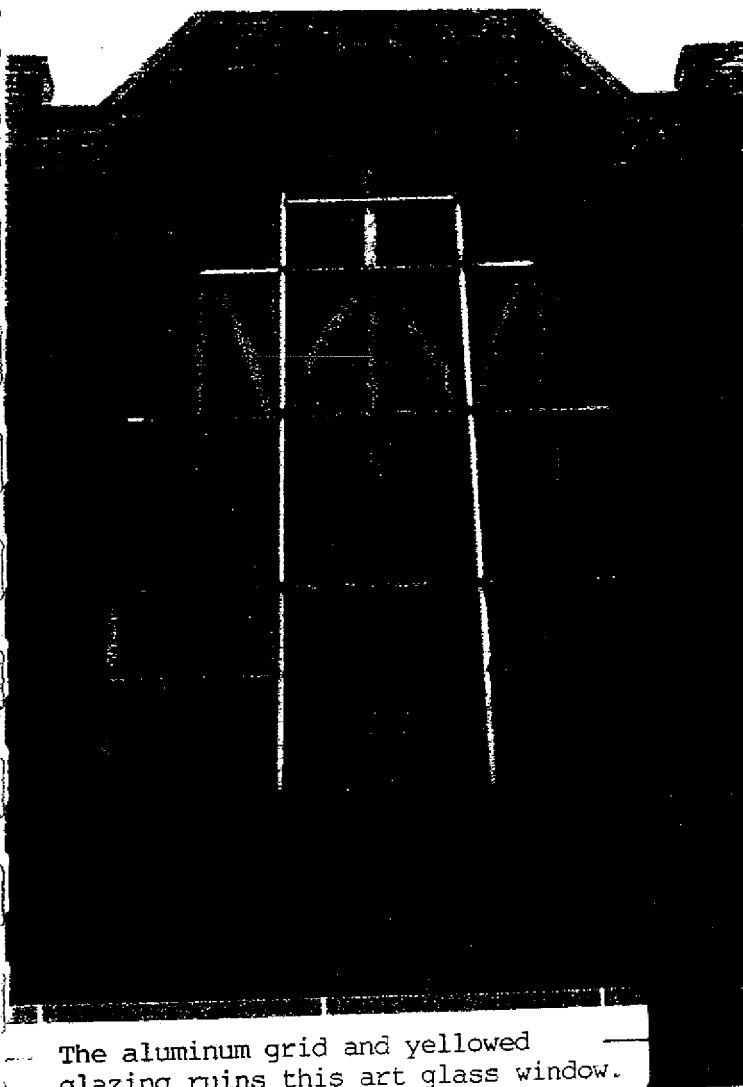
The PG had hazed and yellowed so extensively that it was impossible to evaluate the condition of the art glass prior to removal of the PG. Upon removal of the PG in September of 1995, it became apparent that the painted sections of the window were plated and a number of the outer plates were broken from vandalism. The window frame was also in seriously deteriorated condition. The plated art glass could not have been broken with the PG in place, therefore the window was vandalized prior to PG installation.

PG REMOVAL/ALTERATION REASONS:

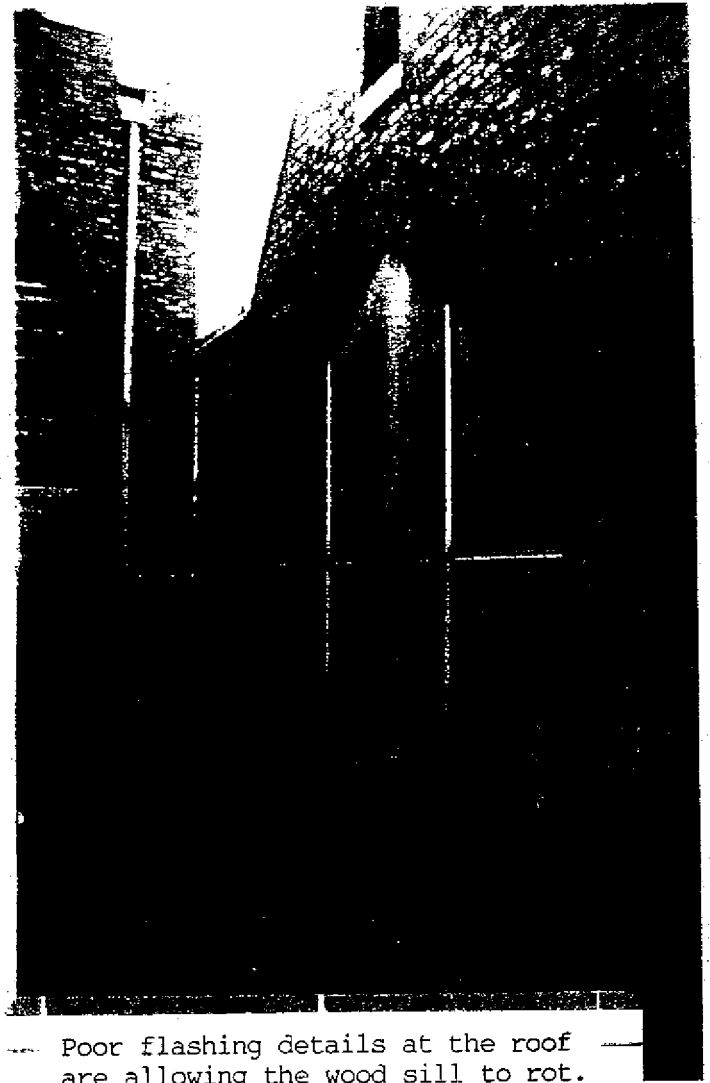
The aesthetics of the badly hazed PG, as well as the disruptive frame, have bothered the church for many years. The yellow glazing is also muting the color of the window to the interior of the church.

FINAL RESULTS:

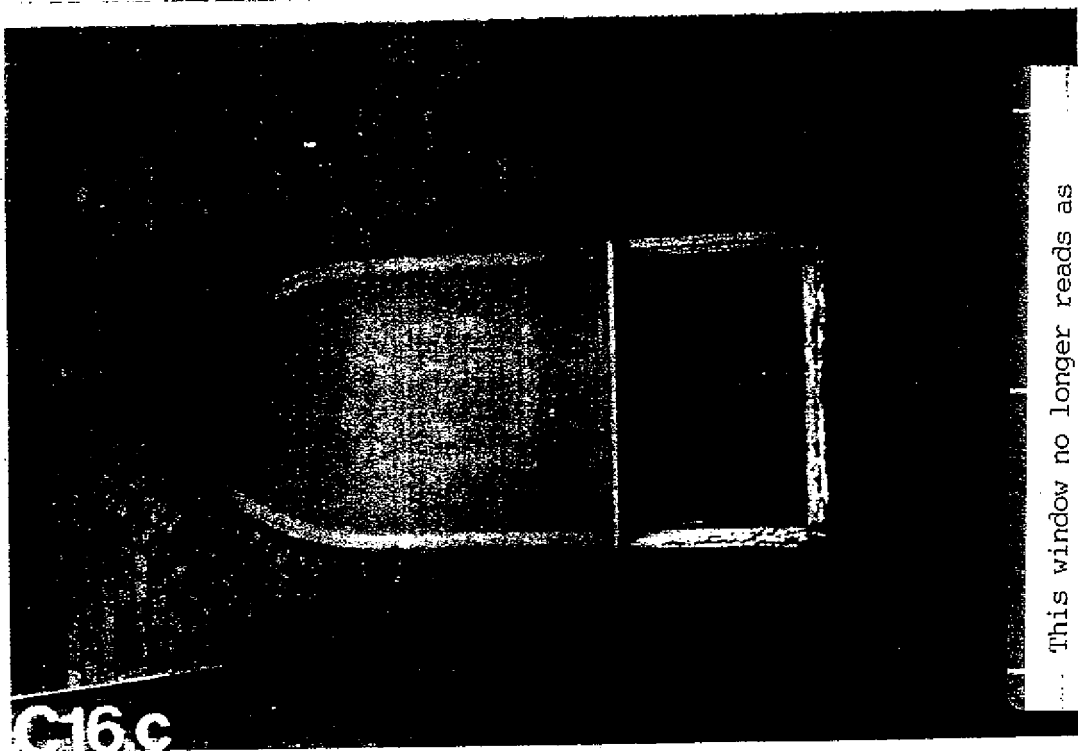
[The existing PG was reinstalled.] Test results revealed that sound transmission through the window remained the same, with or without PG. However, with the PG temporarily removed, the daylight more than doubled from 17 footcandles to 36 footcandles. The surface temperature of the art glass dropped approximately 12°F during the test. Unfortunately, due to the advanced state of deterioration, and the need for full restoration, the existing PG had to be reinstalled since neither the project or church budget could cover the restoration costs. This proves to be a prime example of the challenges owners will face once the decision is made to remove PG. Stained glass stewards should be prepared to face serious window deterioration problems upon removing PG that has been in place for a number of years. Window conditions may reveal that restoration projects and PG removal must be placed on hold while the funds are raised to restore the stained glass properly. As an initial test, owners should remove several PG panels around the building, ideally on different elevations, to determine the condition of the window frame and art glass in the interspace. Serious deterioration could undermine the window's structure and the church or synagogue may need to leave problematic PG in place or temporarily pull the stained glass for safe storage until proper restoration is feasible (see Case Study #1 photos also Figs. C16 in Appendix A).



The aluminum grid and yellowed glazing ruins this art glass window.



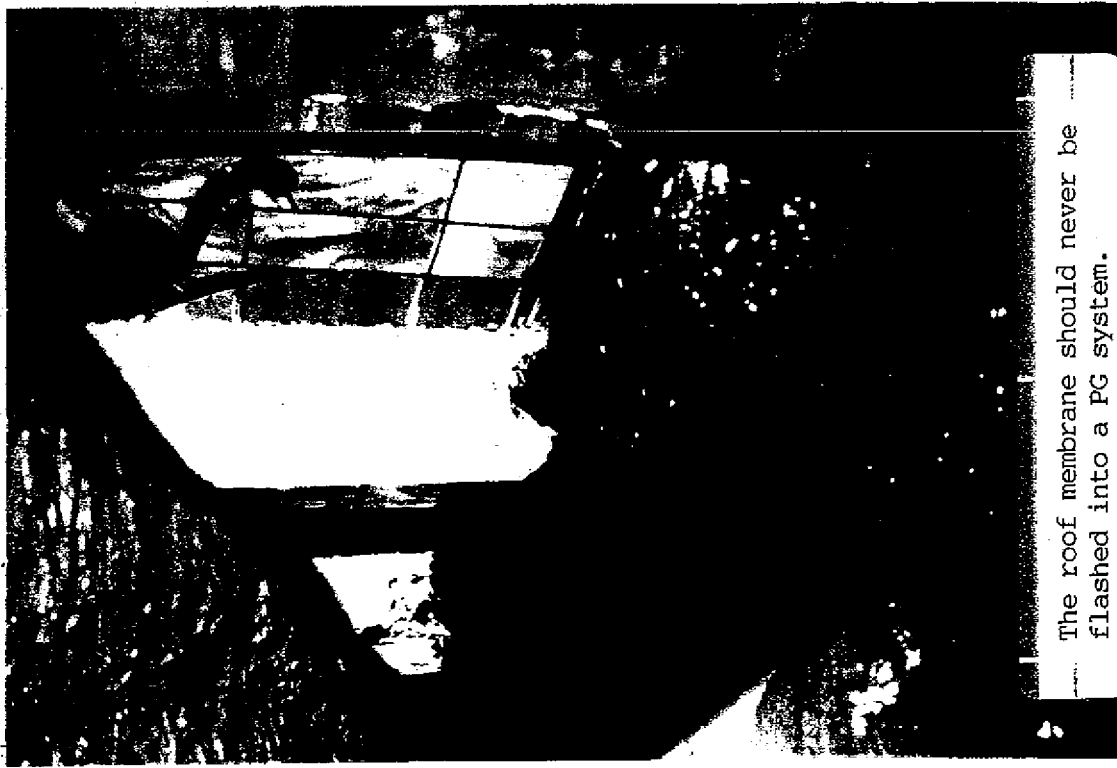
Poor flashing details at the roof are allowing the wood sill to rot.



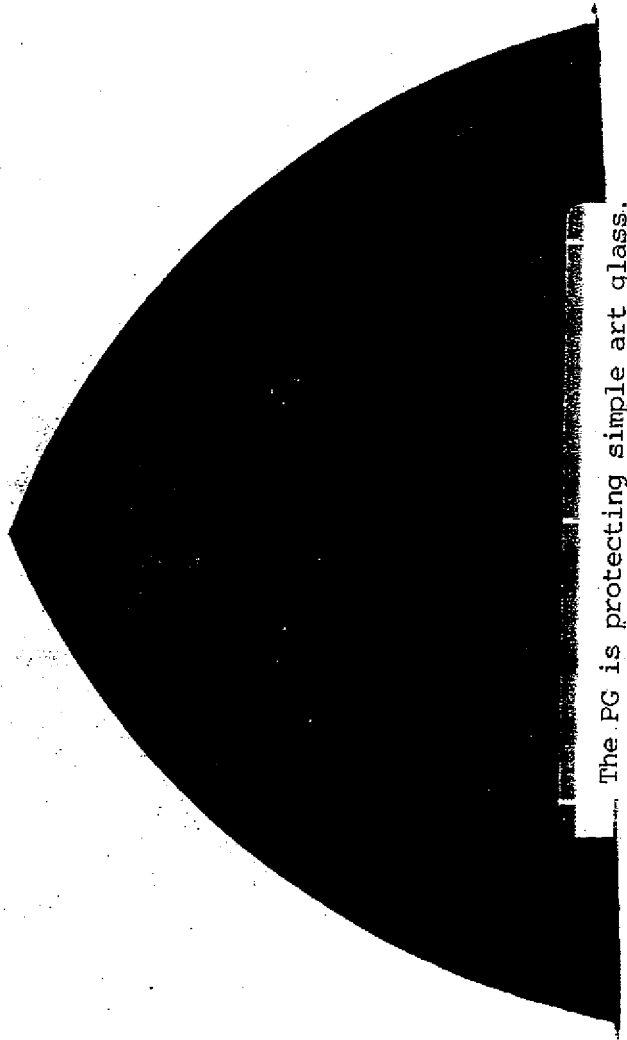
This window no longer reads as an aperture in the wall.

CASE STUDY #1

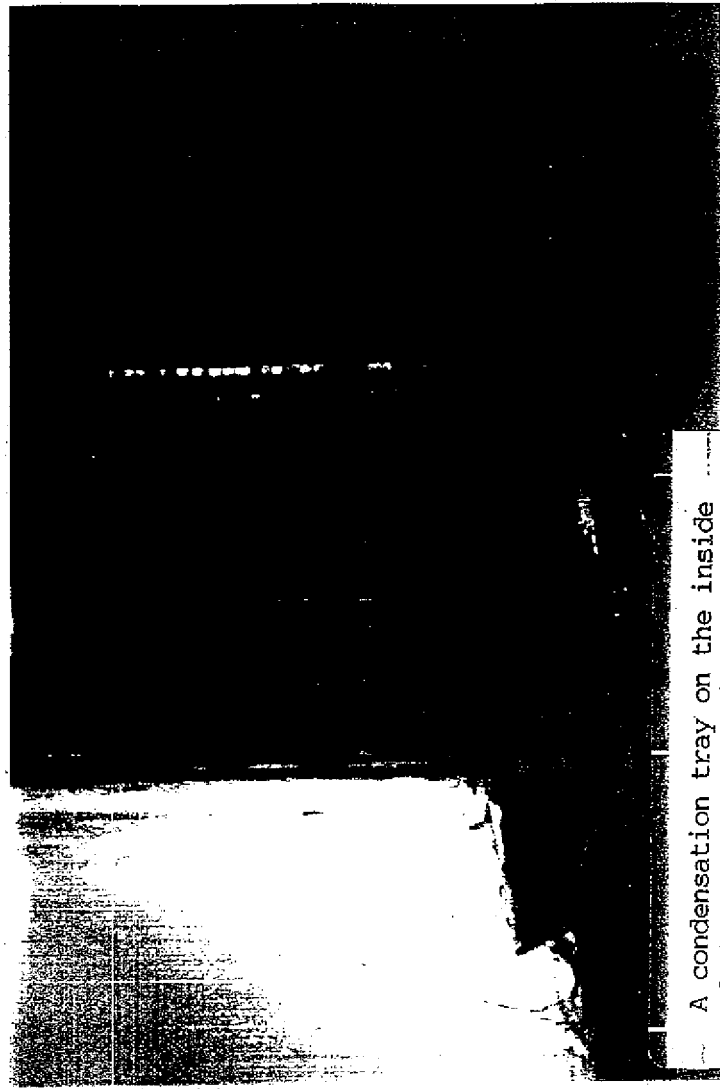
C16.c



The roof membrane should never be flashed into a PG system.



The PG is protecting simple art glass.



A condensation tray on the inside

PROTECTIVE GLAZING CASE STUDY #2

Covenant United Methodist Church (1911), Evanston, Illinois

WINDOWS: 1911 Amber Art Glass
WINDOW ORIENTATION: West
WINDOW VALUE: Low
VANDALISM/SECURITY RISK: Low
YEAR PG WAS INSTALLED: 1985
PG SQUARE FOOTAGE: 1,000 (all windows)
PG INSTALLATION COST: \$27,000
PG COST PER SQUARE FOOT: \$27
PG MATERIAL: Lexan® & anodized aluminum

PG INSTALLATION REASONS: The PG was installed due to energy concerns, but the church discovered that there was not a significant change in their heating bills.

PG INSTALLATION METHOD: The PG was installed in large sheets over the wood window frame and screwed into the outer molding around the perimeter. A subframe of anodized aluminum with snap-in stops was screwed into the window frame and sill for additional support and caulked with silicone. The PG created a deep 5½" interspace around most of the window, while center-pivot ventilators were piggybacked (flush) so that they could operate.

WINDOW CONDITIONS:

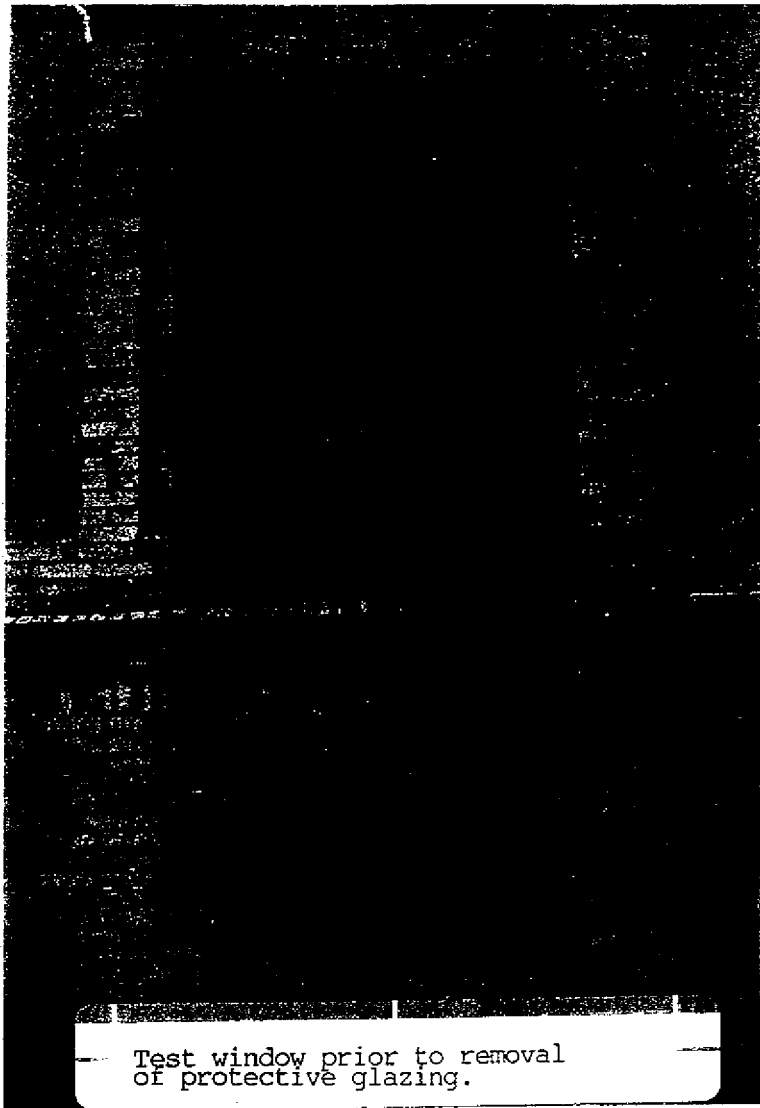
Three art glass windows were investigated upon removal of the PG in September, 1995. Most of the windows still have the original leading. The interspace was soiled and dirt had collected on the outer face of the art glass. It was also apparent that condensation had caused the leads to oxidize in the interspace and that white lead carbonate had collected on the surface of the comes and wood sill. The original waterproofing on the art glass windows was missing in areas, but the art glass did not show any deformation. The paint on the wood window frame was sun-faded and chalking in areas. The PG was generally sturdy and showed no apparent signs of failure, except for several bowed pieces on the large south window; however, all of the PG has badly hazed.

PG REMOVAL/ALTERATION REASONS:

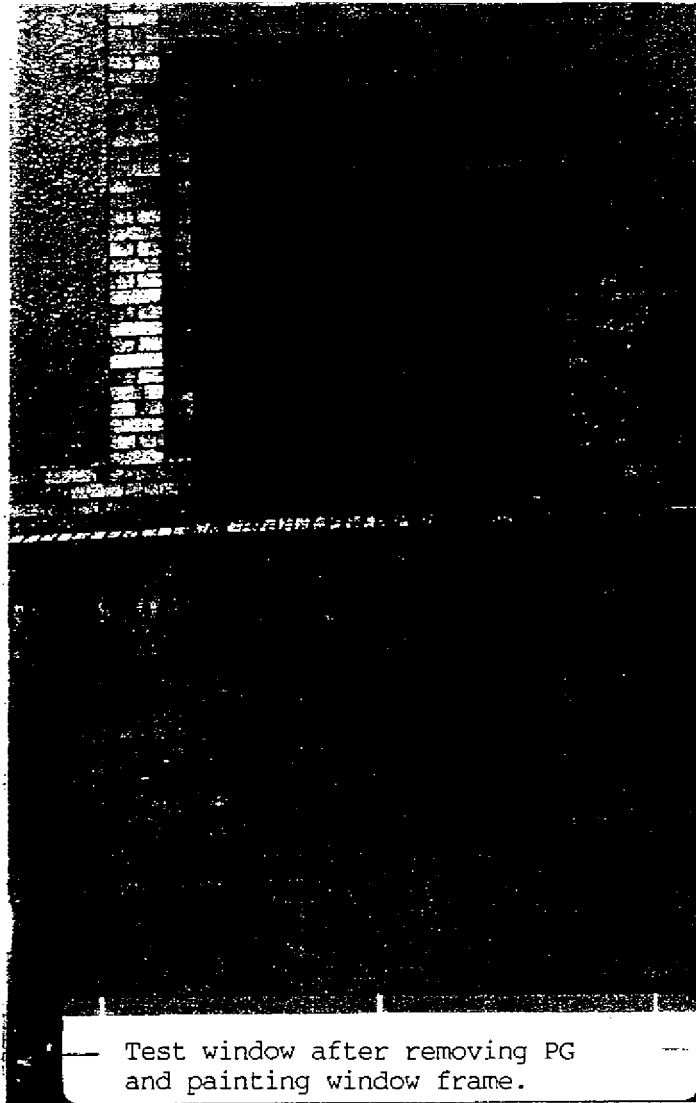
The aesthetics of the PG has bothered the church since it hazed over several years after installation. The church scale, massing and aesthetics compliment its middle to upper-middle income two-story residential community. As noted by the pastor, Reverend Nick Mitrovich, the hazy PG *"gives the building an industrial appearance."* Vandalism is never non-existent, but it is very low in this area and the church is not overly concerned about the simple art glass windows of readily-available amber glass. Architecturally, the hazy PG ruins the depth and color of the windows, one of the most important features of the eclectic Prairie School/Tudor Gothic design. As for the energy concerns, the church noted that the PG has not shown any significant savings. Inspired Partnerships discovered that although the sanctuary was separately zoned, the church was not setting the thermostat back during unoccupied periods. Moreover, the boiler was not operating properly and required some adjustments and repairs.

FINAL RESULTS:

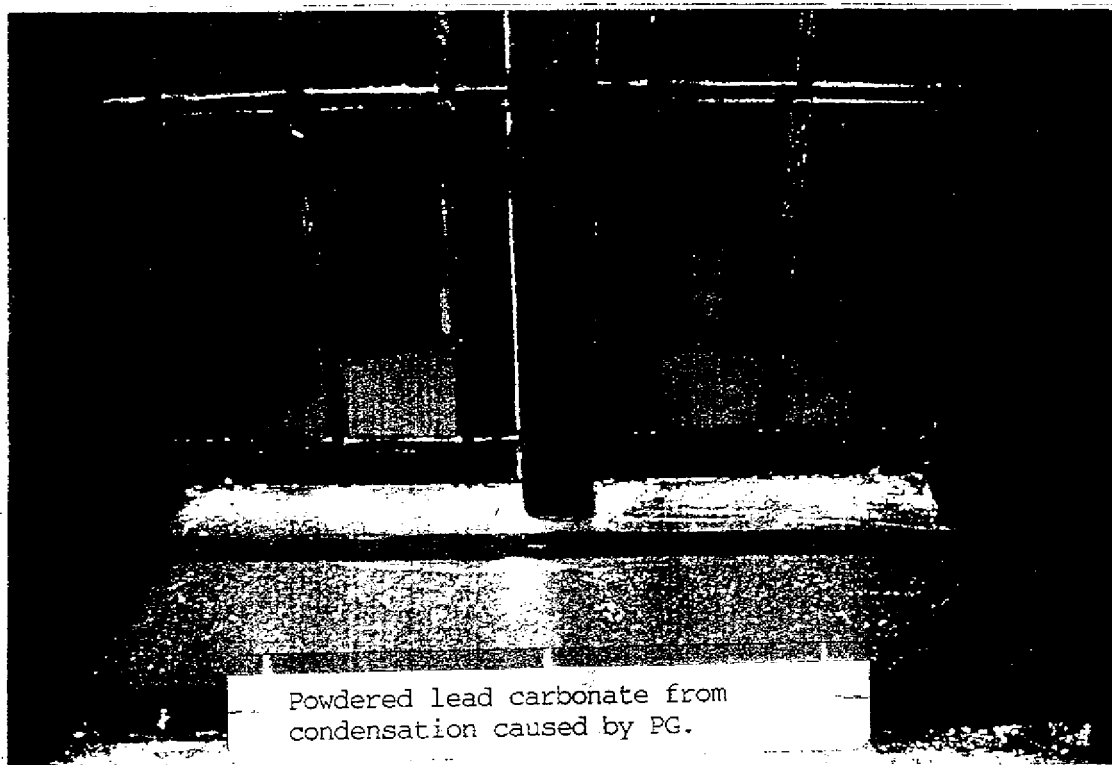
[The existing PG was removed.] The church regrets installing the PG ten years ago, and intends to remove it from all of the windows. Unfortunately, removal could cost \$25,000 or more, money which could have been used for ongoing window maintenance. Test results after removal indicated that sound transmission increased about 14% but is still a negligible 70 to 90 decibels from passing trucks. The surface temperature of the glass only dropped four degrees. However, daylight through the art glass increased between 40% to 80% depending on window orientation! Aesthetically, the bland red and tan brick walls are greatly improved by the PG-less recessed window and blood-red trim (which would be even better if painted the original evergreen color). Although very simple, these windows repeat the design of the louvered vents of the tower and are the most prominent architectural features on the building (see Case Study #2 photos also Figs. C14 in Appendix A).



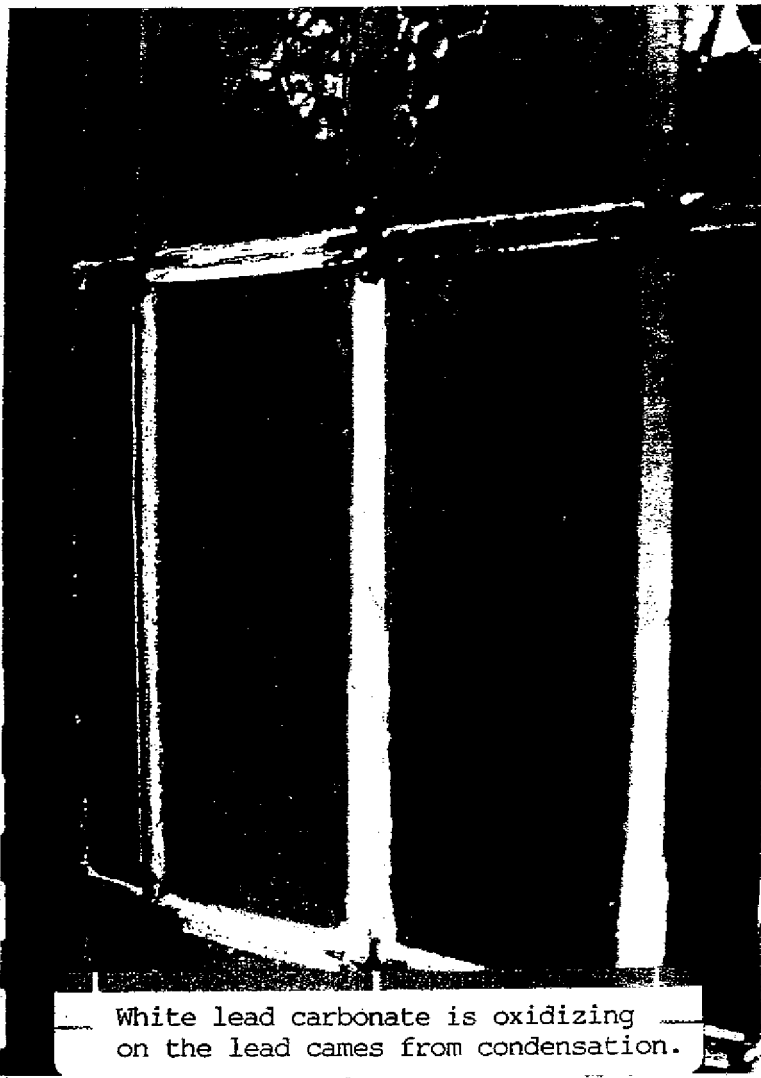
Test window prior to removal
of protective glazing.



Test window after removing PG
and painting window frame.



Powdered lead carbonate from
condensation caused by PG.



White lead carbonate is oxidizing on the lead comes from condensation.



Refurbishing this window cost \$250.



The window design harmonized with the belfry vents but is lost with PG.

PROTECTIVE GLAZING CASE STUDY #3

First Lutheran Church of Logan Square (1906), Chicago, Illinois

WINDOW: 1906 "catalog" opalescent art glass & painted glass

WINDOW ORIENTATION: South

WINDOW VALUE: Low

VANDALISM/SECURITY RISK: High

YEAR PG WAS INSTALLED: ca. 1980

PG SQUARE FOOTAGE: 1,100 (all windows)

PG INSTALLATION COST: Unknown

PG COST PER SQUARE FOOT: Unknown

PG MATERIALS: ¼" float glass, and acrylic & steel framing

PG INSTALLATION REASONS: Changing demographics and higher vandalism called for installation of PG. According to church trustee, Mr. Bob Straeder, *"several years ago they threw a brick through our window which had a note attached that simply said...legalize drugs."*

PG INSTALLATION METHOD: The PG is float glass installed against an outer stop within the original window frame. The glass was secured with wood moldings nailed into the frame and glazing putty. The PG was set about ½" away from the art glass.

WINDOW CONDITIONS:

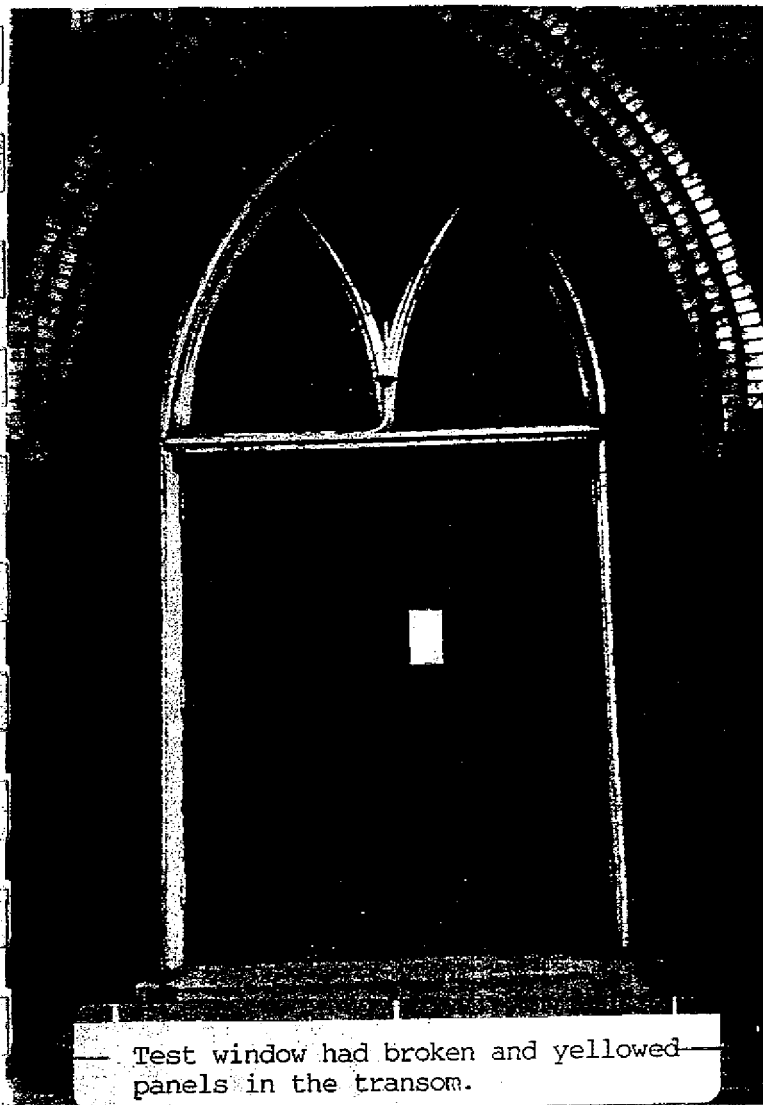
The door transom art glass window was investigated upon removal of the PG in December, 1995. The interspace was dirty and most of the original sealants and glazing putty were exhausted. The leaded panels had previously deformed and were braced with flat saddle bars that were soldered onto the window. These were poorly attached and the panels were deforming again, as evident when they were pulled to be flattened and repaired for this case study project. Vandalism continues to be a problem in this commercial, light-industrial Chicago neighborhood and several glass storms have been broken over time.

PG REMOVAL/ALTERATION REASONS:

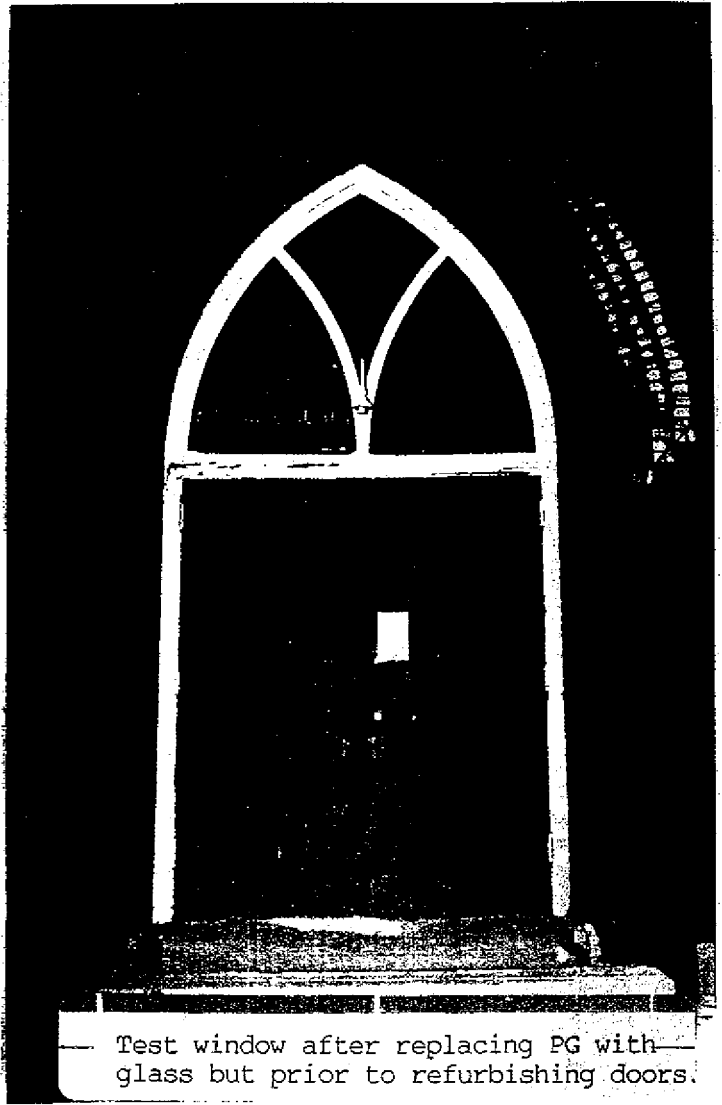
Given the proven high vandalism in the area, PG is required. The church wanted to repair several broken storm glass panels and improve the appearance of the building. Condensation problems have been observed at the church on several occasions and the poorly-fired painted glass is losing paint. Much of this paint loss may have been caused by window leaks before the PG was installed. The transom over the front door was selected as a place to begin -- with the intention of additional entrance improvements and other window repairs as capital funds are available. Two of the three arched panels require replacement; one was badly broken and the other (which had been replaced with acrylic) had badly yellowed. The planned PG program is to repair all broken glass to discourage further vandalism, and to vent the windows to the interior.

FINAL RESULTS:

[The existing PG was replaced and vented.] Test results during temporary removal indicated that sound transmission only increased a few decibels despite the window location approximately 15 feet from a heavily traveled Chicago street. The alterations were completed on an overcast day so the surface temperature of the window could not be measured. Daylight only increased from 8 footcandles to 10 footcandles due to cloudy skies dirty glass PG. This case study endorsed the single best reason to use PG: when real vandalism threats are present. It also further revealed that PG systems, like any other building components must be maintained and should be included in on-going window and trim maintenance (see Case Study #3 photos, also Figs. C23 in Appendix A).

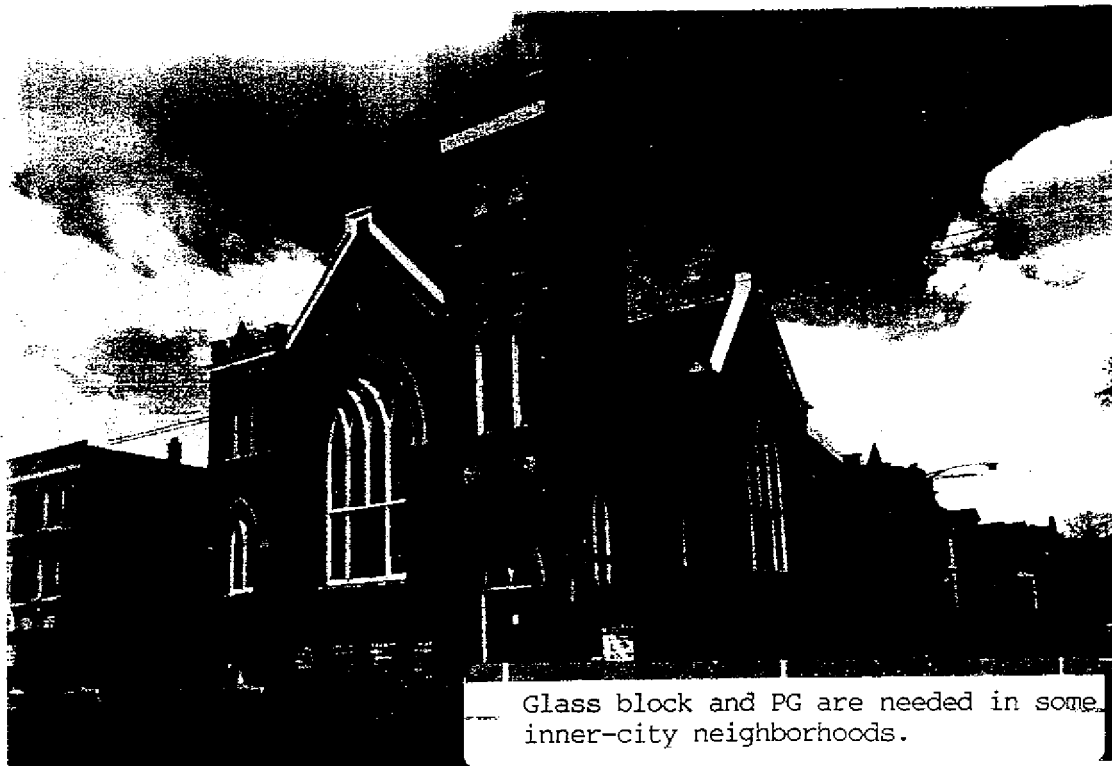


Test window had broken and yellowed panels in the transom.



Test window after replacing PG with glass but prior to refurbishing doors.

CASE STUDY #3



Glass block and PG are needed in some inner-city neighborhoods.

PROTECTIVE GLAZING CASE STUDY #4

First Presbyterian Church of Lake Forest (1886), Lake Forest, Illinois

WINDOW: 1886 opalescent Art Glass by McCully & Miles

WINDOW ORIENTATION: East

WINDOW VALUE: High

VANDALISM/SECURITY RISK: Low

YEAR PG WAS INSTALLED: 1979

PG SQUARE FOOTAGE: 230

PG INSTALLATION COST: \$3,000

PG COST PER SQUARE FOOT: \$13

PG MATERIALS: Polycarbonate & aluminum channels

PG INSTALLATION REASONS: The original "Cross & Crown" window was blocked from view on the interior by a pipe organ installed in 1974 and sealed off with insulation and a drywall partition. Apparently, there was no desire to restore the window several years later when it was covered with PG. In speculation, the PG was apparently installed to address concerns regarding possible leaks in the wall cavity which could not be viewed on the interior due to the drywall partition. Lake Forest has very low vandalism.

PG INSTALLATION METHOD: The PG is a polycarbonate, probably *Lexan*® which was installed against an outer stop within the original window frame. The PG was secured with aluminum channels nailed into the frame and caulked with clear silicone. The PG was set about 3" away from the art glass.

WINDOW CONDITIONS:

The art glass window was investigated upon removal of the PG in September, 1995. Most of the original sealants, glazing putty, and art glass leading were exhausted. The leaded panels were deformed near the bottom despite repairs performed during the 1940s and early 1970s. The window frame had deteriorated along the wood sill where moisture could pond against the caulked PG. The paint on the exterior frame was chalked and faded behind the PG. An access hole had to be cut into the drywall to inspect the window from the interior. The inside surface of the glass was filthy, indicating condensation, and was attracting and holding dirt against the glass. The PG had not been repaired since its installation and was still securely attached to the window frame; the silicone was holding up extremely well (as typical) and was difficult to remove. The PG had badly hazed.

PG REMOVAL/ALTERATION REASONS:

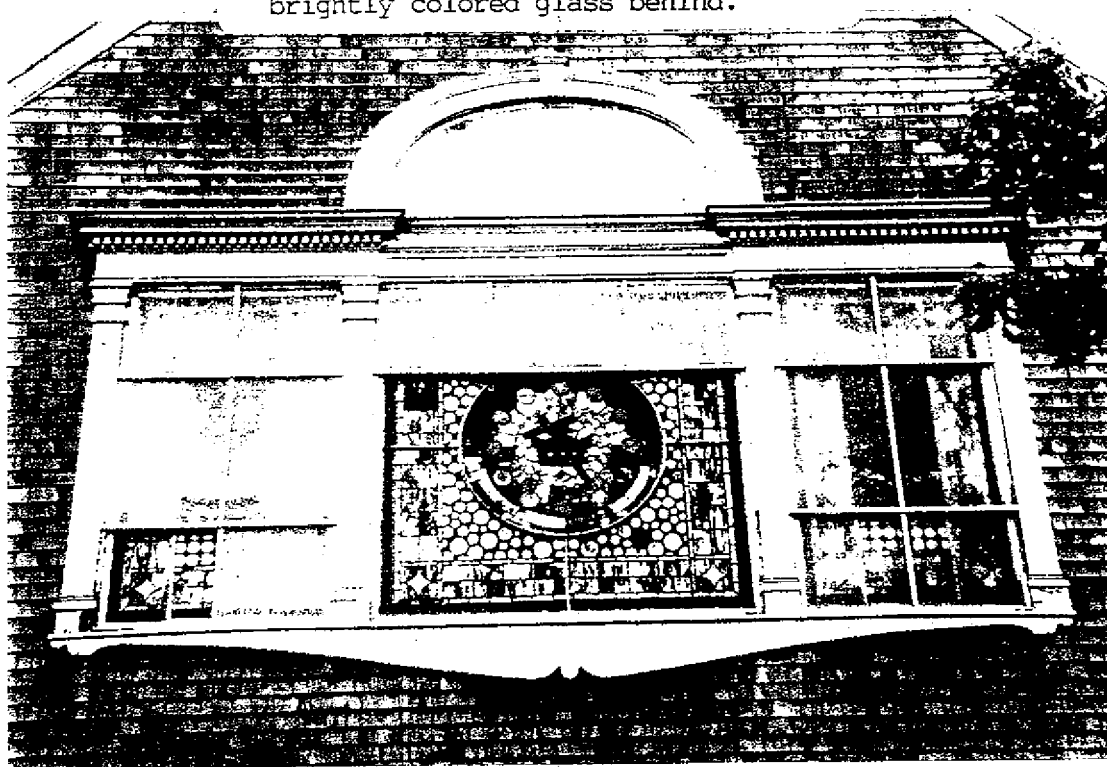
The church is in the process of planning a phased restoration program for all of the stained glass windows. Several PG panels were initially removed to determine the priority for the Cross & Crown window in relation to other stained glass in the church. Due to the advanced deterioration of this window, it was determined to be the first priority. The remaining PG was removed and a 45 foot lift was rented to obtain accurate bids on removal and restoration of the art glass. Once the window was viewed without the hazed PG and grid, a decision was made not to install new PG. The opalescent glass not only adds color, it harmonizes with the texture of the wood shingles.

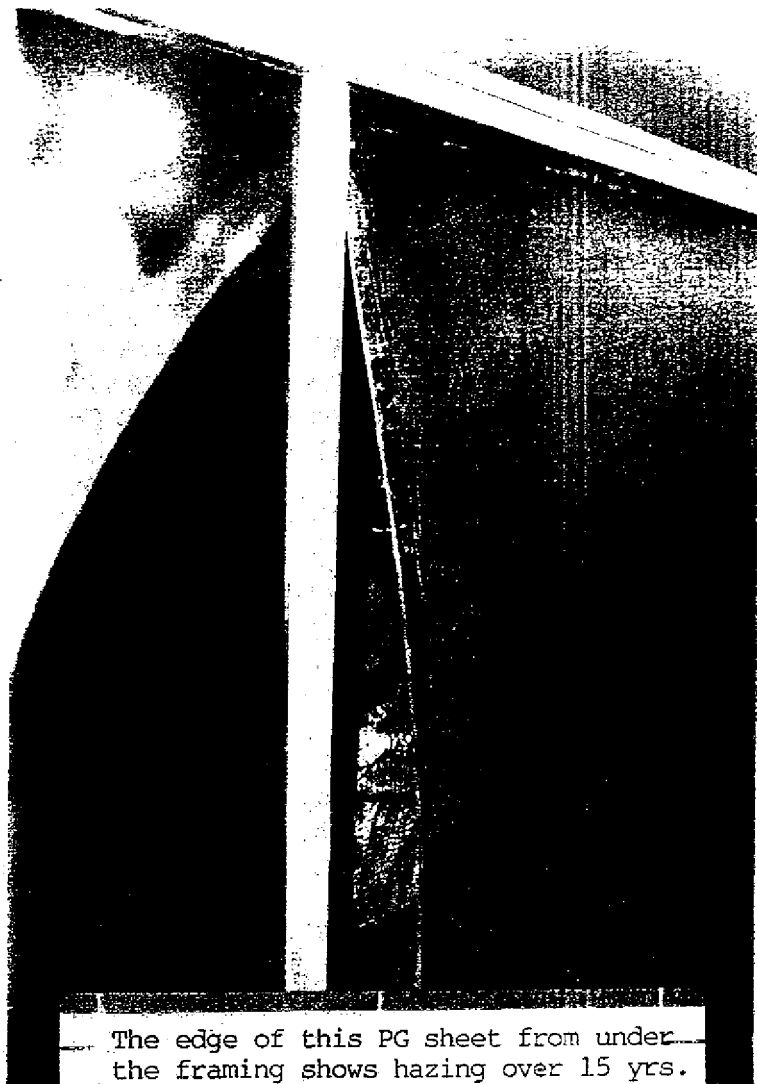
FINAL RESULTS:

[The existing PG was removed and the window will be totally restored.] Light, sound and temperature testing was not possible since the interior wall was not accessed until all of the PG had been removed. The art glass has been removed for restoration and will be reinstalled this spring for a contracted price of \$48,500. Removal of the existing PG added about \$2,000 to the project cost, while not reinstalling PG will save about \$5,000. The church intends to backlight the window, possibly with neon, since it can no longer be viewed on the interior. This case study reveals that PG is used to defer restoration costs for even wealthy congregations who have other building priorities. It also clearly shows the importance of color and texture to a building's architecture -- which is lost when art glass is covered with PG (see Case Study #4 photos).



Removal of the hazed PG revealed the brightly colored glass behind.

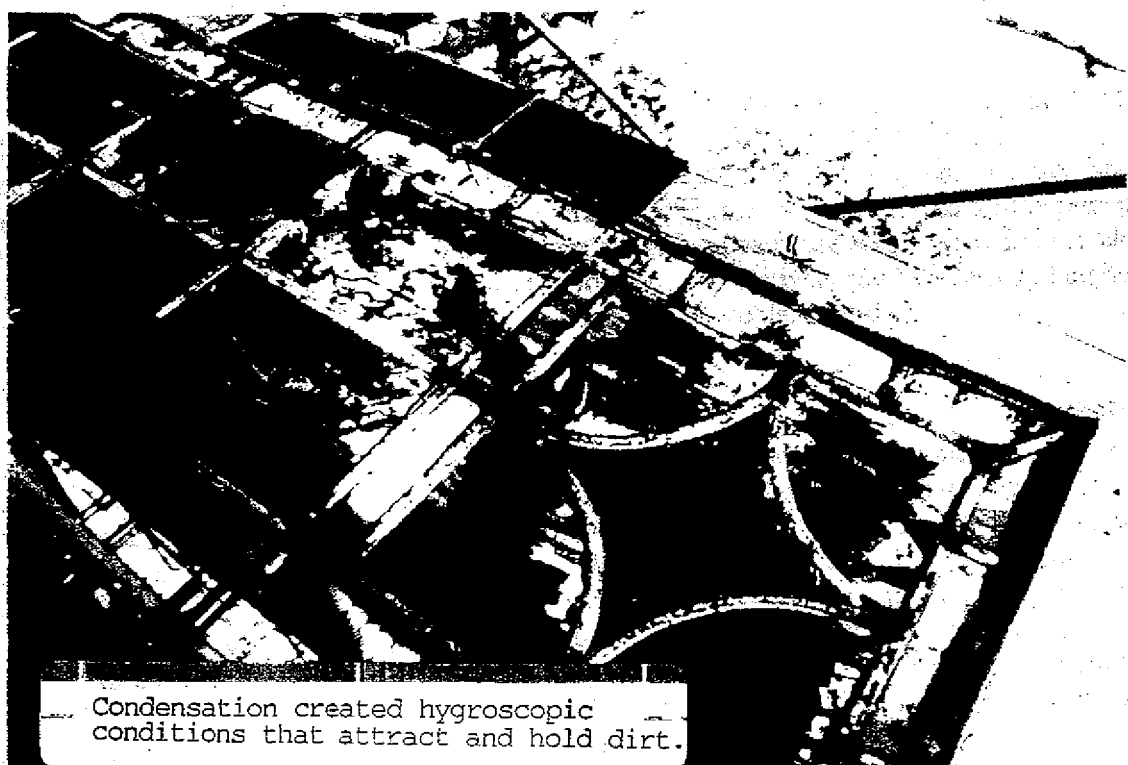




The edge of this PG sheet from under the framing shows hazing over 15 yrs.



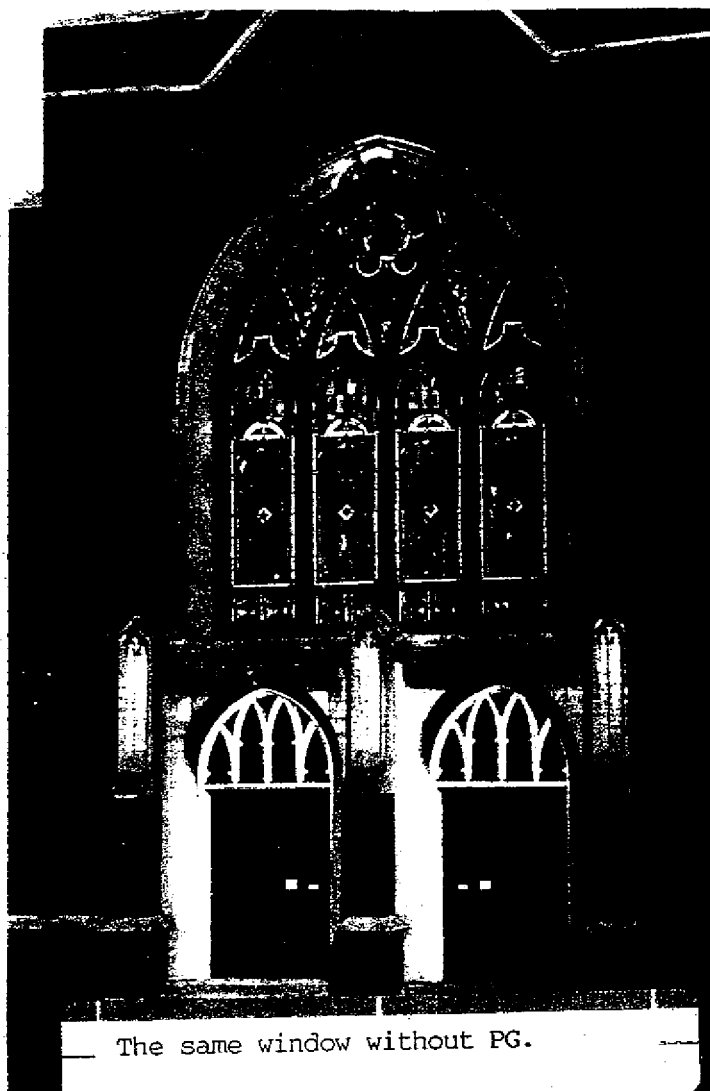
Condensation in the window caused corrosion of the steel frame.



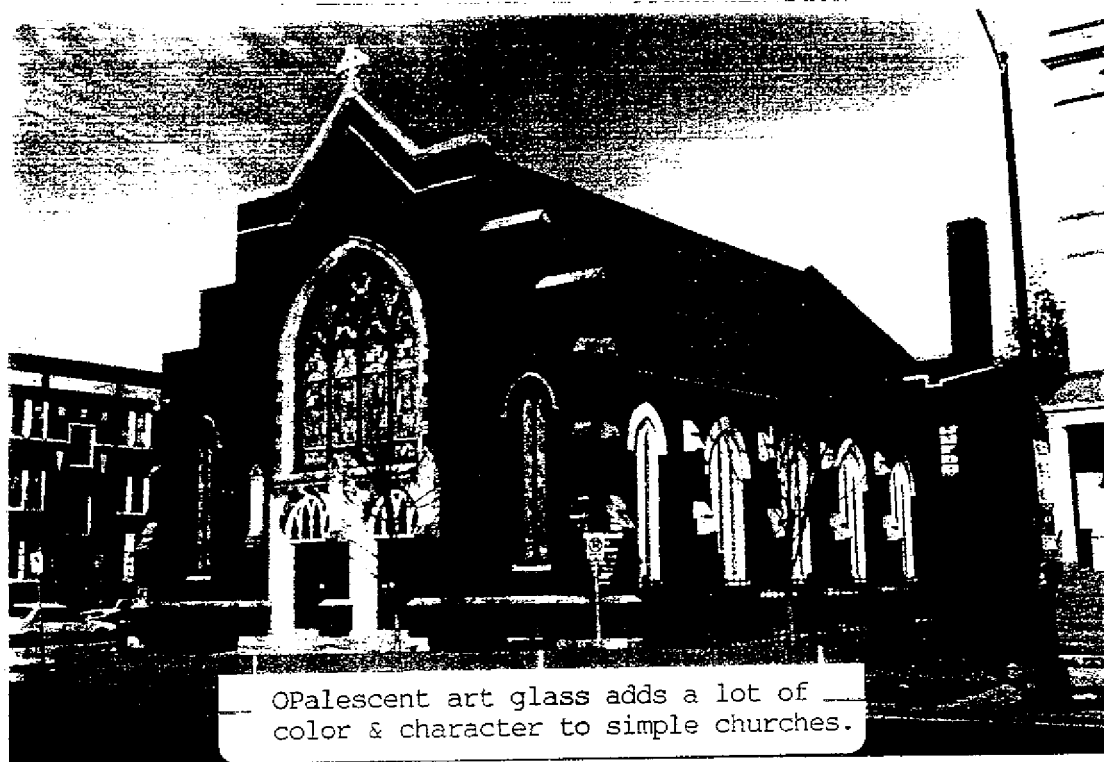
Condensation created hygroscopic conditions that attract and hold dirt.



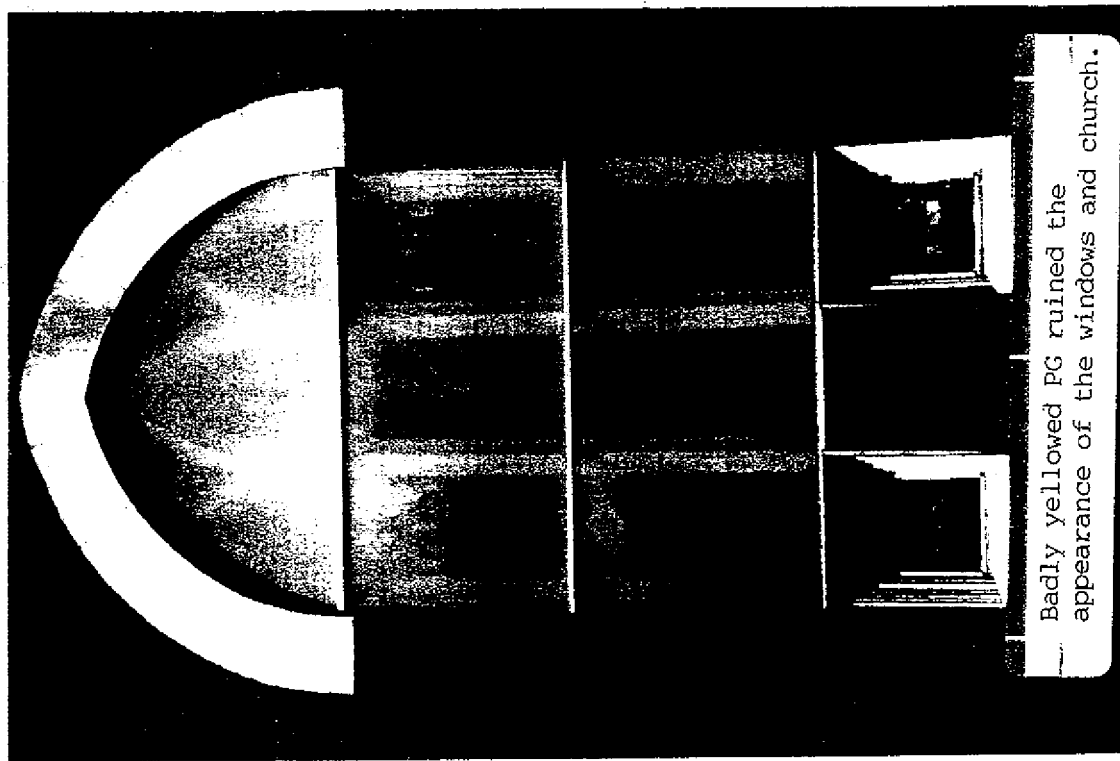
A 1995 PG installation was installed improperly and failed within months.



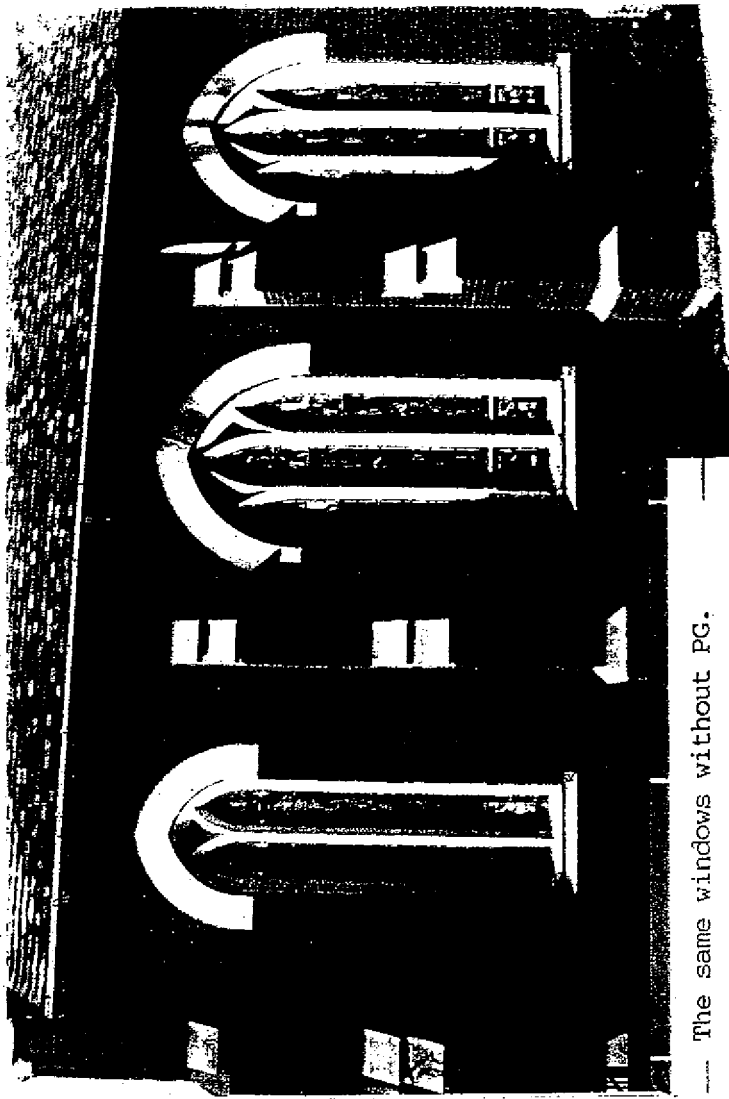
The same window without PG.



Opalescent art glass adds a lot of color & character to simple churches.



Badly yellowed PG ruined the appearance of the windows and church.



The same windows without PG.



PG finally causes condensation that

PROTECTIVE GLAZING CASE STUDY #6

Hyde Park Union Church (1906), Chicago, Illinois

WINDOW: 1995 rose stained glass window by Willet Studios

WINDOW ORIENTATION: East

WINDOW VALUE: High

VANDALISM/SECURITY RISK: Low

PG AGE: 1987

PG SQUARE FOOTAGE: 200 (rose window)

PG INSTALLATION COST: \$1,960 (rose window)

PG COST PER SQUARE FOOT: \$10

PG MATERIALS: Lexan® & aluminum

PG INSTALLATION REASONS: The PG was installed to "protect" the rose window as directed and paid for by a descendent of the original rose window stained glass donor.

PG INSTALLATION METHOD: The PG was installed against the outer window frame and secured with screws and clear silicone. The PG was set about 3" away from the stained glass. The large sheets of PG were divided up into 16 sections by a grid of aluminum channels.

WINDOW CONDITIONS:

The stained glass has been flattened and braced as recent as the 1980s and was in good condition overall. However, the original 1906 window frame was in seriously deteriorated condition. Upon removal of the PG, it was discovered that the contractor "repaired" the frame with fiberglass cloth, bondo, paint and caulk before installing the PG less than ten years ago. The wood frame laminations were rotting and separating, particularly from six o'clock to 9 o'clock (as typical). The PG was hazed and the framing was weak and buckling badly.

PG REMOVAL/ALTERATION REASONS:

The PG was investigated to determine why it was failing and whether it was necessary. The church was concerned about liability and the loose PG falling and injuring someone. Upon further investigation, it became readily apparent that the entire rose window frame was weak and flexing within the stone surround. Water infiltration over the years and previous poor repairs had contributed to the separation of the wood laminations and rot. The entire PG was removed for a full evaluation and the church decided to have the stained glass removed to restore the wood window frame. The church believes the PG caused condensation and heat-build up that contributed to the deterioration of the wood frame. The church sets the sanctuary thermostat back and is also convinced that there is no significant energy savings from PG over the rose window. Finally, given the window's height (over 30 feet above grade), and the church location in Hyde Park near the University of Chicago, the vandalism risk was determined to be relatively low.

FINAL RESULTS:

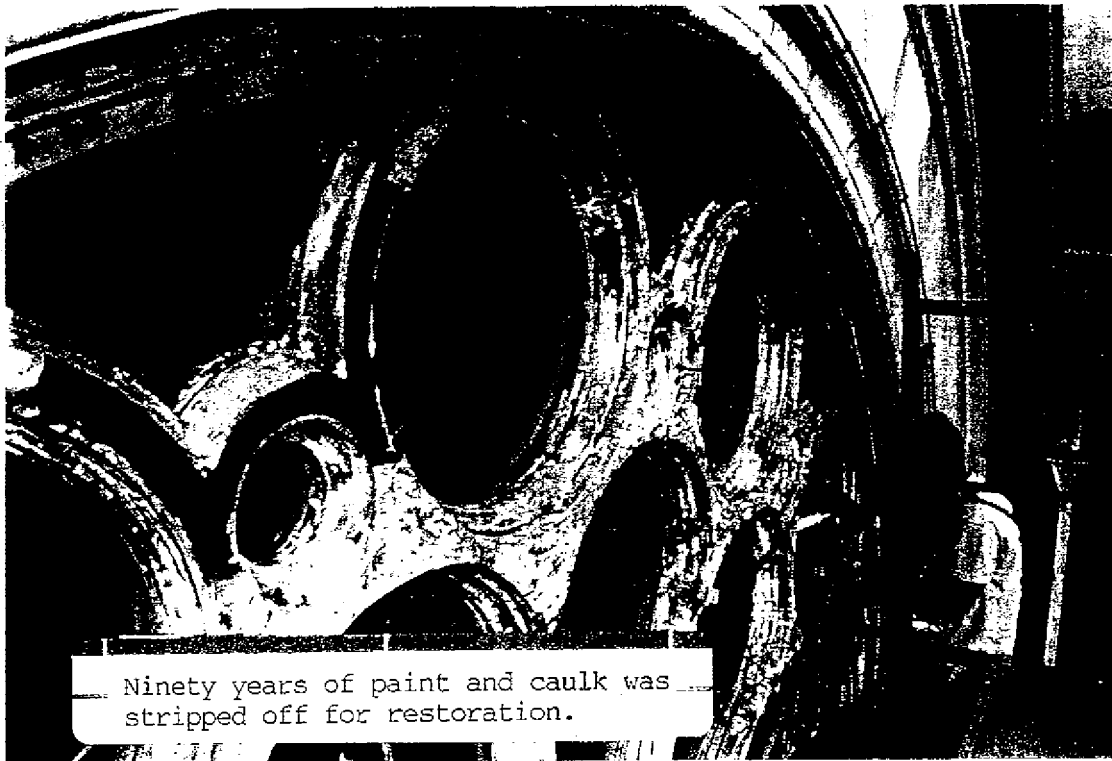
[The existing PG was removed and the window will be totally restored.] Test results indicate that the increase in sound transmission is negligible; probably because the rose window is over 30 feet above street level. Daylight only increased about 8% through the relatively dark red, blue, purple and green stained glass. The surface temperature of the glass dropped 11°F within a few minutes after the PG was removed. The frame is partially restored and the stained glass has been reinstalled at the close of this study; the exterior frame will be restored in spring of 1996. The church does not intend to reinstall any PG which will save about \$8,000 (if properly installed within the tracery). The total cost of restoration will be approximately \$45,000. Hyde Park Union is an excellent example of how PG is too often used to defer badly needed restoration; the rose window was dangerously close to collapse prior to restoration (see Case Study #6 photos and C4 in Appendix A).



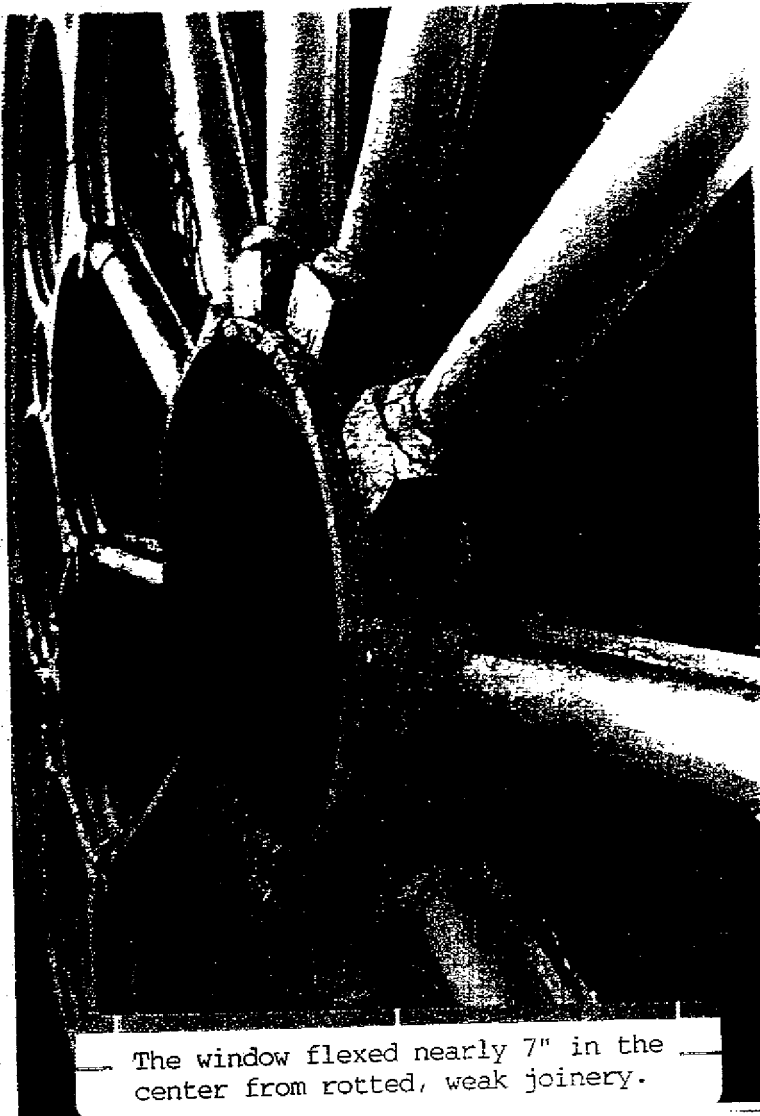
All the stained glass was removed to restore the frame.



Prior to covering the window with PG the studio made repairs with bondo!



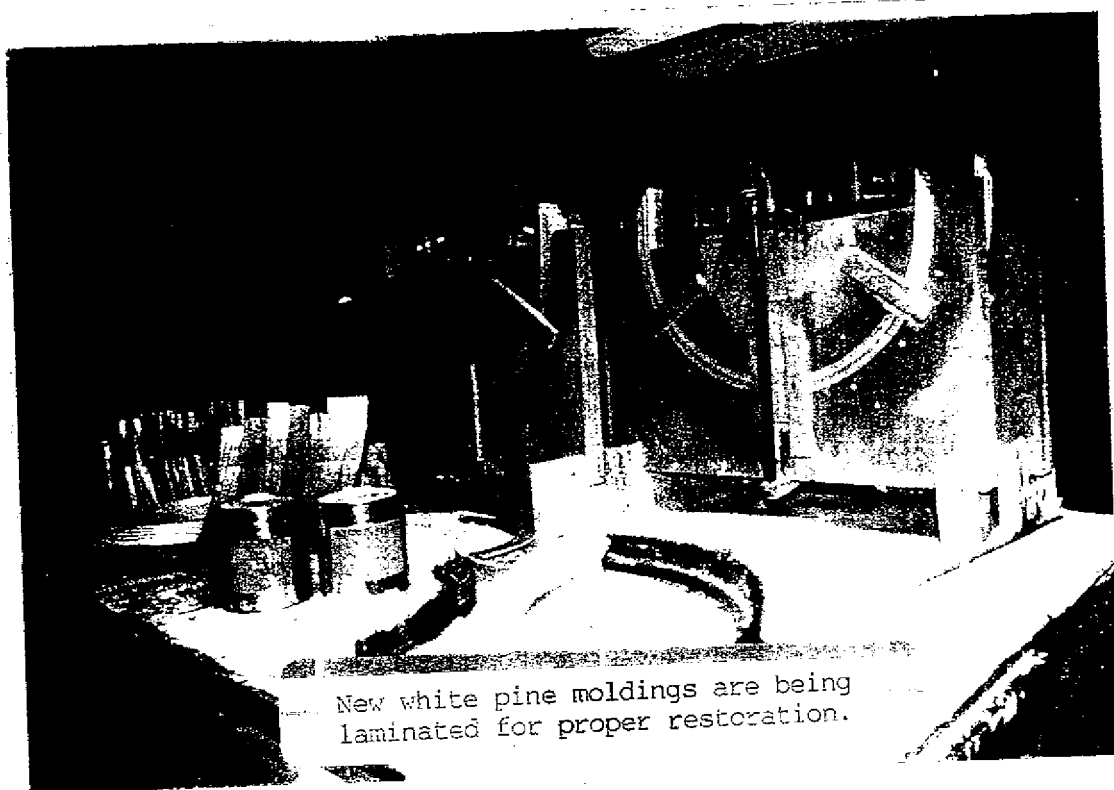
Ninety years of paint and caulk was stripped off for restoration.



The window flexed nearly 7" in the center from rotted, weak joinery.



Many sections of the rose window had rotted requiring replacment.



New white pine moldings are being laminated for proper restoration.

PROTECTIVE GLAZING CASE STUDY #7

Lake View Presbyterian Church (1888), Chicago, Illinois

WINDOW: 1888 "catalog" art glass
WINDOW ORIENTATION: South
WINDOW VALUE: Low
VANDALISM/SECURITY RISK: Moderate
YEAR PG WAS INSTALLED: 1970s
PG SQUARE FOOTAGE: 80
PG INSTALLATION COST: Unknown
PG COST PER SQUARE FOOT: Unknown
PG MATERIALS: Lexan® & aluminum moldings

PG INSTALLATION REASONS: The PG was presumably installed to "protect" the art glass, although the church cannot recall specific reasons.

PG INSTALLATION METHOD: The PG was installed about 2½" away from the stained glass and secured against the outer window frame with screws and clear silicone. It was divided into a six-section grid by aluminum moldings with snap-in beads. The interspace was not ventilated. PG was piggybacked onto upper ventilators.

WINDOW CONDITIONS:

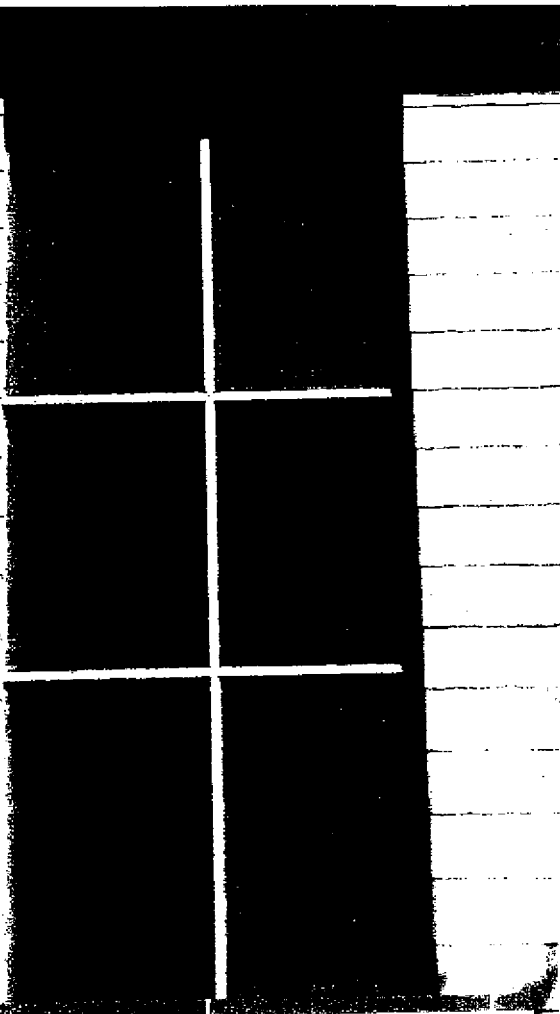
The art glass has been repaired several times over the past 110 years, but has never been releaded. The case study window has folded along the bottom 1" border and all of the original putty and sealants for the window are exhausted. Upon removal of the PG, the outer face of the art glass was covered with dirt; probably caused by the hygroscopic attraction of condensation. In particular, it was observed that the glass jewels in the window had heavier concentrations of dirt on the top side. This indicated that dirt was settling without any air flow in the window. If the window had been ventilated, the updraft of warm rising air would theoretically caused heavier dirt deposits on the underside of the jewels. The wood frame was deteriorated, particularly the outer molding and sill.

PG REMOVAL/ALTERATION REASONS:

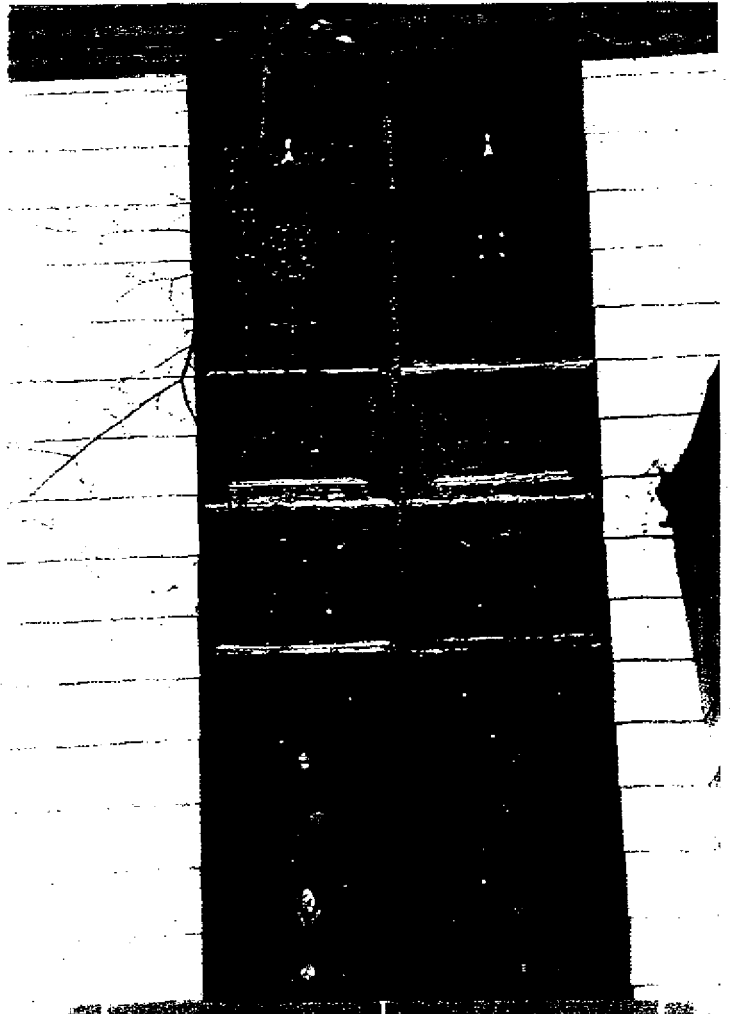
This church was selected due to its historic and architectural value, which has been ruined by modern materials. Designed by Burnham & Root, the 1886 wood-shingle church once had a very quaint, rural character rarely found due to Chicago's revised fire codes by the early 20th century. However, composite siding and asphalt shingles added in the 1930s, and PG added in the 1970s, smothered the warm colors and delicate textures of the historic materials. The church wants to inspire a exterior restoration and removing the PG is a step in that direction.

FINAL RESULTS:

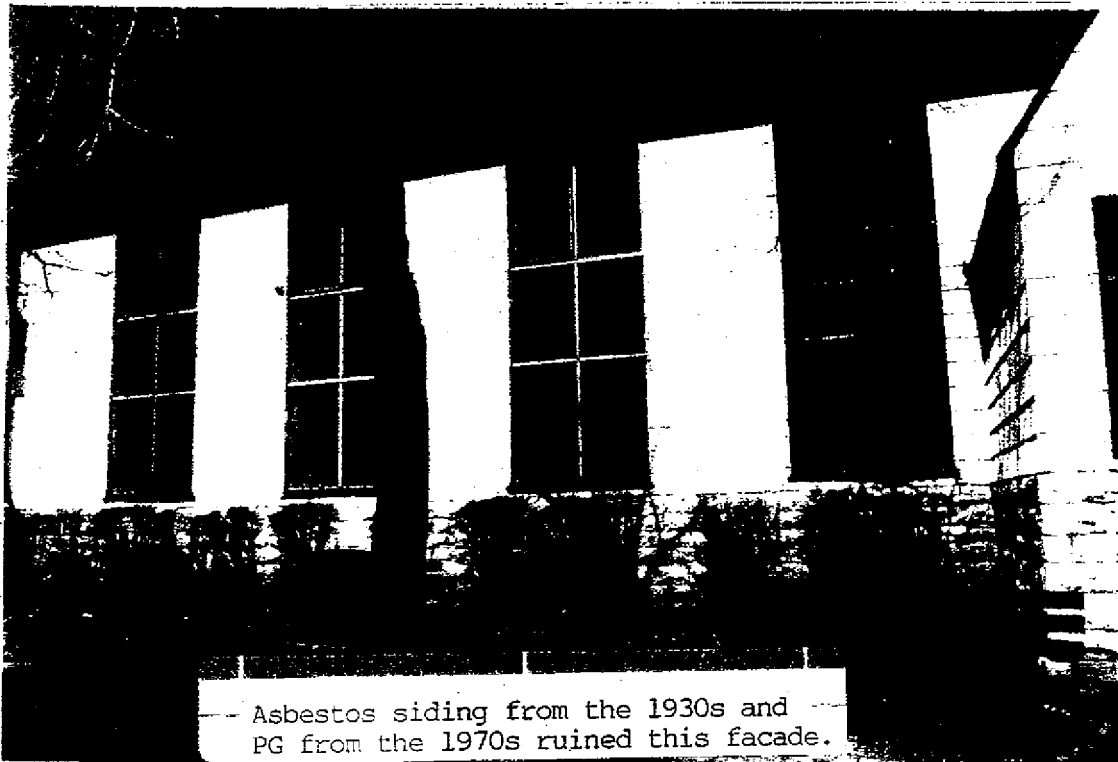
[The existing PG was removed and the art glass was waterproofed.] Test results indicate that sound transmission only increased two decibels, despite the window's close proximity to a major Chicago thoroughfare with bus traffic. Daylight only increased one footcandle despite the badly hazed PG since the window was so dirty. Cleaning the outer surface of the art glass doubled the daylight through the window, and restored a "luster and sparkle" [to the art glass] "not seen in years" The surface temperature of the glass dropped 13°F within a few minutes after the PG was removed. The church hopes to continue PG removal soon, and strip off the composite siding in the next few years. (see Case Study #7 photos and C8 in Appendix A).



Test window prior to PG removal.



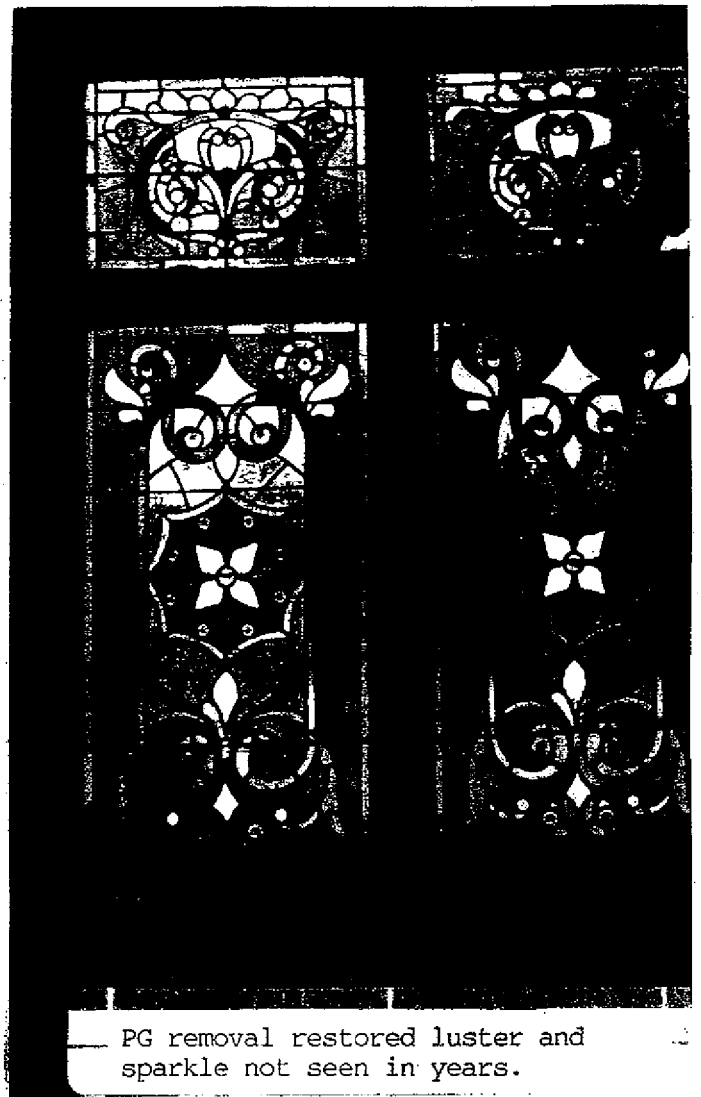
Test window after PG removal.



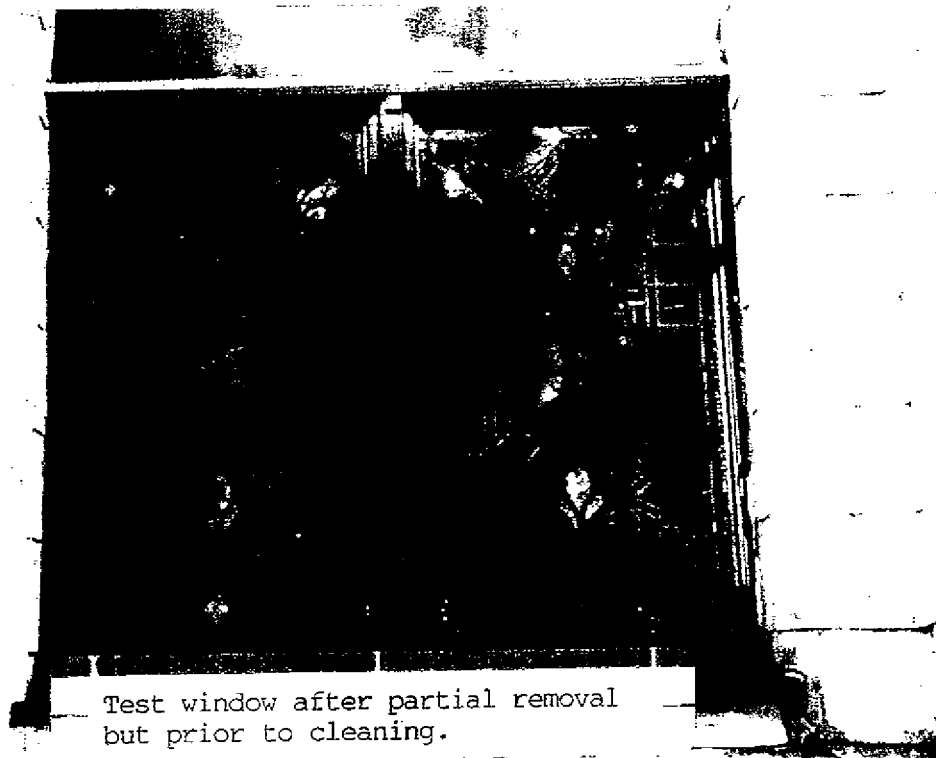
Asbestos siding from the 1930s and PG from the 1970s ruined this facade.



— This view compares two windows with and without PG.



— PG removal restored luster and sparkle not seen in years.



— Test window after partial removal but prior to cleaning.

PROTECTIVE GLAZING CASE STUDY #8

Levere Temple (1929), Evanston, Illinois

WINDOW: 1929 plated opalescent Tiffany
WINDOW ORIENTATION: East
WINDOW VALUE: Irreplaceable
VANDALISM/SECURITY RISK: Low
YEAR PG WAS INSTALLED: 1985
PG SQUARE FOOTAGE: 150
PG INSTALLATION COST: Unknown
PG COST PER SQUARE FOOT: Unknown
PG MATERIALS: Lexan® & aluminum t-bars

PG INSTALLATION REASONS: The PG was installed to "protect" the valuable plated opalescent glass and artistry of the renown Louis C. Tiffany Studios.

PG INSTALLATION METHOD: The PG was installed about 3/4" away from the stained glass and secured against the limestone with masonry anchors and latex caulk. The PG was subdivided into three sections in each lancet by aluminum t-bars that were keyed into the limestone. The interspace was not ventilated; however, the stained glass window is set into the opening with wood blocks which may allow some interior air/moisture into the interspace.

WINDOW CONDITIONS:

The stained glass remains in excellent condition at this time, even though the window has not been restored since its installation 67 years ago. These conditions are certainly attributable in part to the exceptional quality of Tiffany windows. The window shows no deformation and has remained generally waterproof. This was the only fully-plated window included among the ten case study windows.

PG REMOVAL/ALTERATION REASONS:

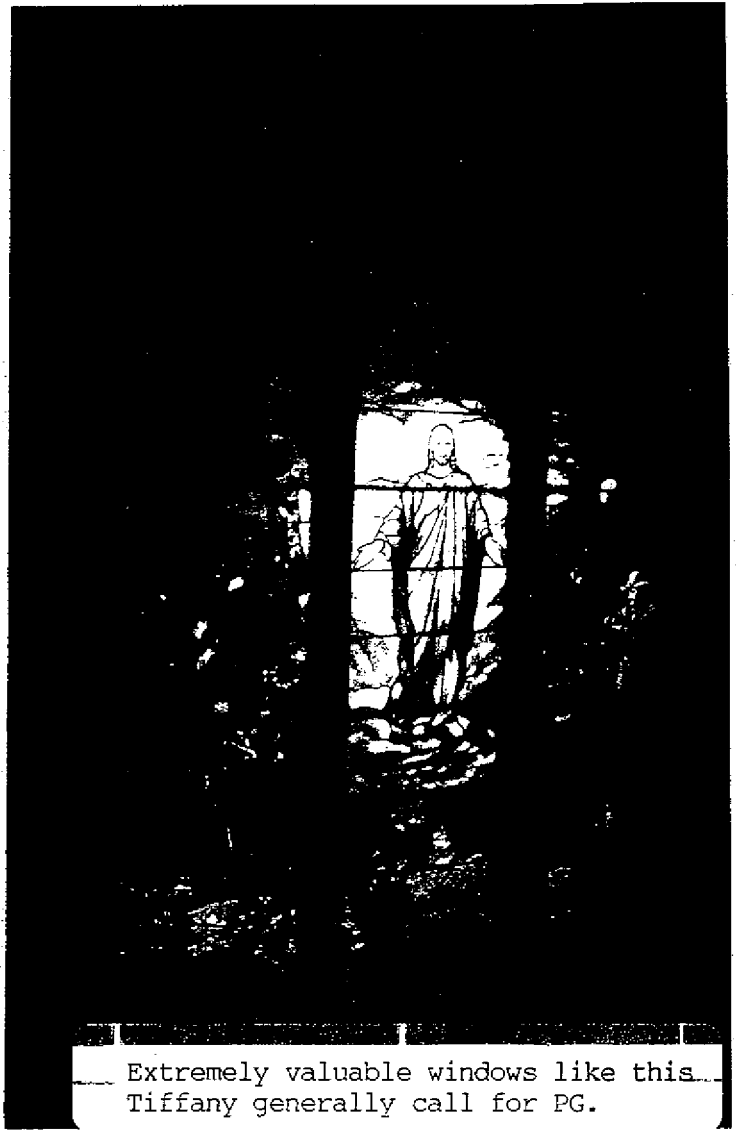
The lexan, as typical, has clouded over, but the window was included in this study due to concerns over extreme condensation problems in the interspace observed on many clear mornings. Even though the window was in excellent condition, the PG has only been in place for a relatively short time and there was a prevailing concern to investigate the condition before any serious problems developed. Levere Temple is located in an upper income neighborhood and adjacent to Northwestern University. Nevertheless, the plated Tiffany window is extremely valuable necessitating protection from any possible vandalism or storm damage. The Lexan® was removed in December, 1995 from the center lancet only and replaced with 1/4" laminated glass that was set further away (1") from the stained glass. The two lower corners and apex of the lancet arch were cropped 1/4" to allow for external air flow across the window.

FINAL RESULTS:

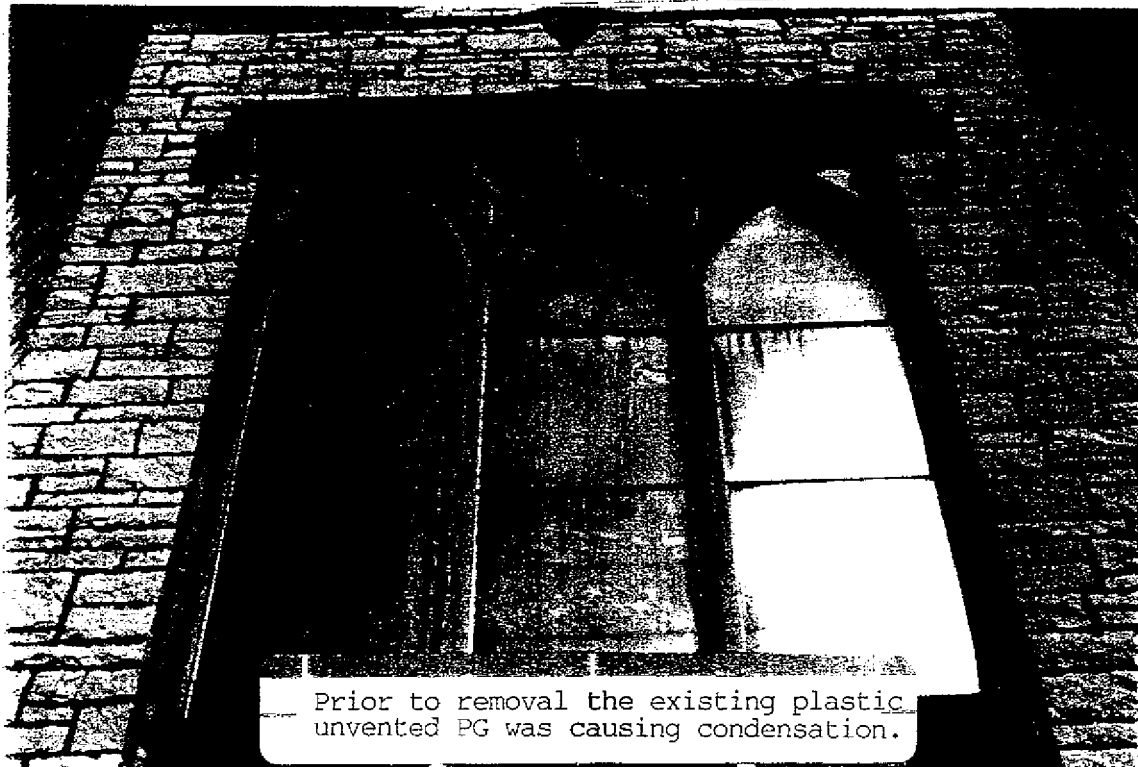
[The existing PG was replaced with 1/4" laminated glass and vented.] Test results indicate that sound transmission was unaffected through the heavily plated window. Daylight only increased one footcandle, also due to the numerous layers of opalescent glass in the plated window. The surface temperature of the glass only dropped a few degrees after the PG was removed. However, the laminated glass allows the window's intense colors to be seen from the outside as well. More importantly, no condensation has been observed since the replacement with ventilated PG (see Case Study #8 photos and C7 in Appendix A).



PG has been removed from the center lancet for maintenance and alteration.



Extremely valuable windows like this Tiffany generally call for PG.



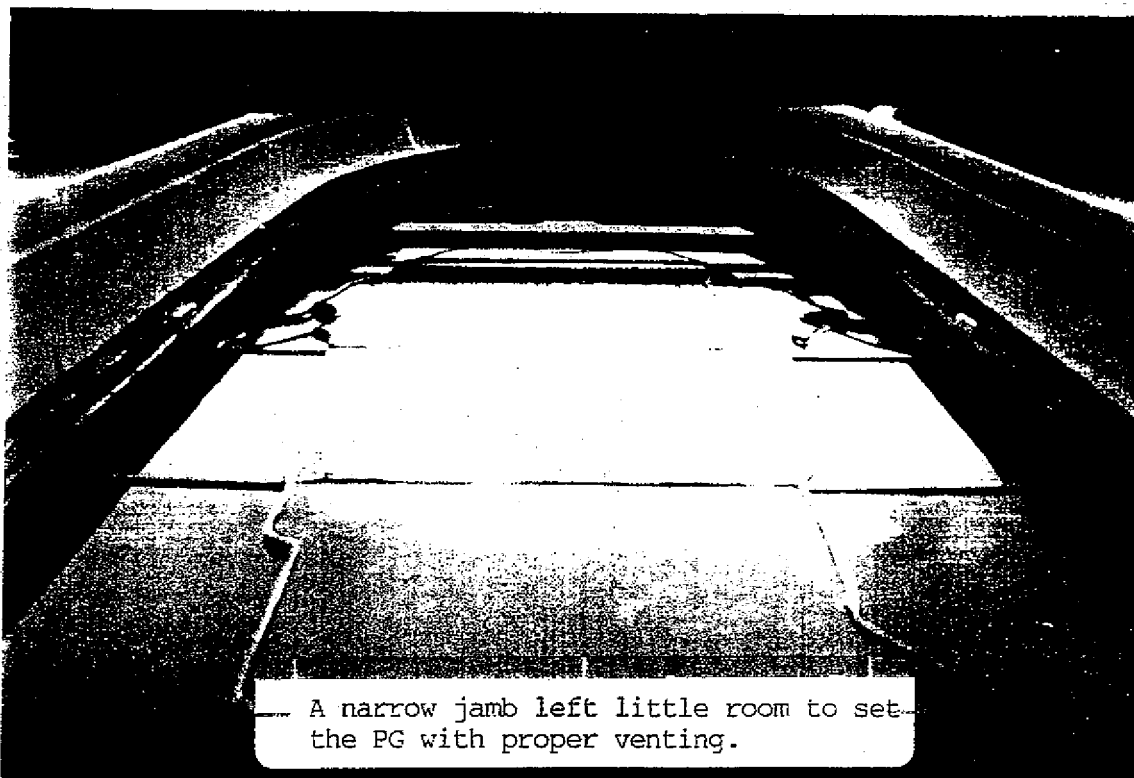
Prior to removal the existing plastic unvented PG was causing condensation.



Sealants had been applied poorly on the existing PG.



The Tiffany window was well built and holding up well despite condensation.



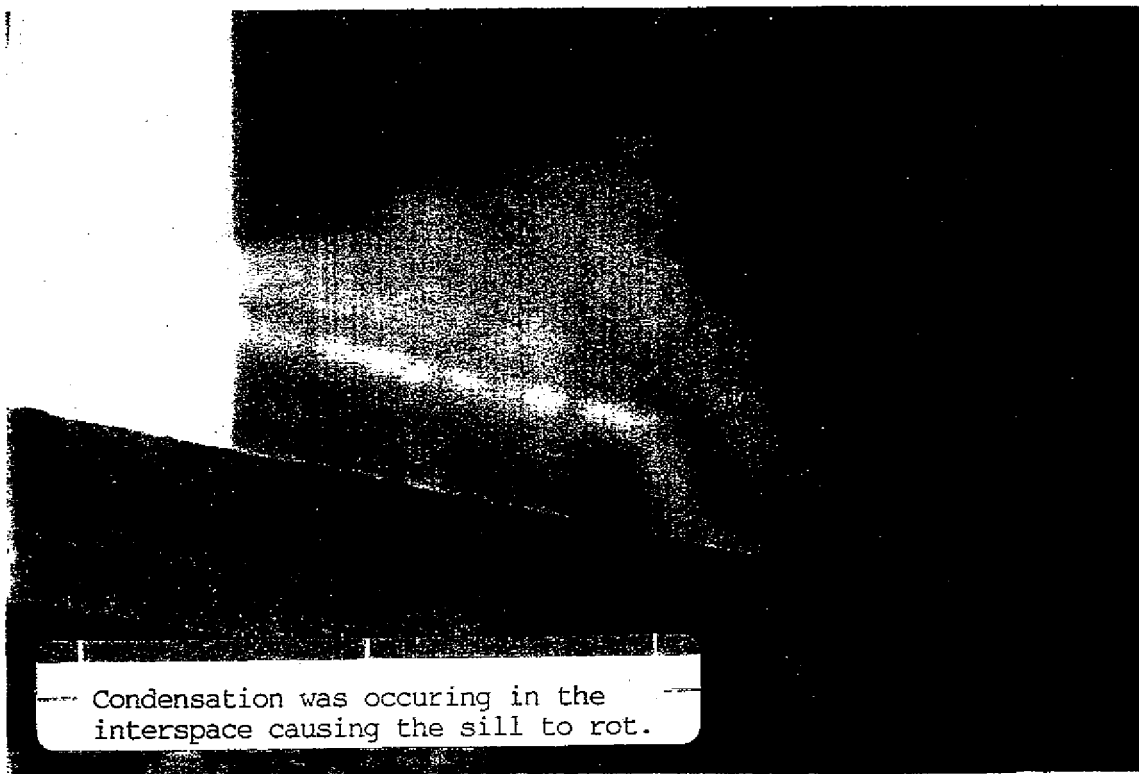
A narrow jamb left little room to set the PG with proper venting.



The church is located in a relatively low risk vandalism area.



The PG installed in 1982 had hazed badly.



Condensation was occuring in the interspace causing the sill to rot.

PROTECTIVE GLAZING CASE STUDY #10

Trinity Episcopal Church (1882), Wheaton, Illinois

WINDOW: 1882 painted antique glass; W.H. Wells Co. (Chicago)

WINDOW ORIENTATION: East

WINDOW VALUE: High

VANDALISM/SECURITY RISK: Low

YEAR PG WAS INSTALLED: 1974

PG SQUARE FOOTAGE: 160

PG INSTALLATION COST: Unknown

PG COST PER SQUARE FOOT: Unknown

PG MATERIALS: 1/4" float glass & aluminum T-bars

PG INSTALLATION REASONS: The PG was reportedly installed for the general protection of the windows. The church undertook partial restoration of the east rose and arched window in 1974, at the time of the PG installation.

PG INSTALLATION METHOD: The PG was installed about 1/2" away from the stained glass and secured against the outer wood frame with points and caulk. The PG was also supported with aluminum T-bars; the T-bars lined up with the arched lancets in the Gothic arched window, but were set in a rectilinear grid over the curvilinear rose window and tracery. The T-bars were then screwed into the wood sash and window frame and the entire glazing was caulked. The interspace was not vented.

WINDOW CONDITIONS:

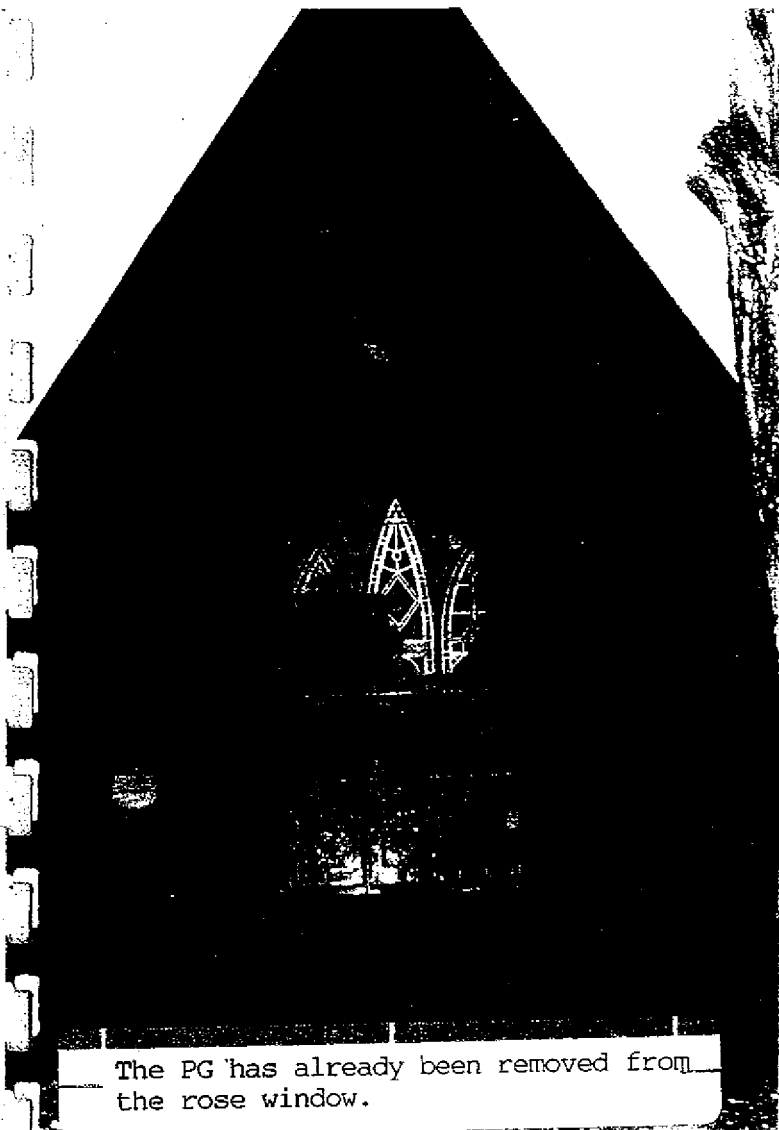
The painted glass, made in Chicago, was well fired and in excellent condition overall. However, the lead comes are deteriorating in a peculiar manner. The new leading from 1974 is peeling or delaminating in thin white sheets and thread-like fibers. This appears to be caused by the deterioration of Japan driers in the putty and applied coatings on the came, which is removing a surface layer of oxidized lead. This condition is likely caused by condensation in the unvented interspace; prevalent among similar window installations facing east. The wood sash and frame is also deteriorating from excess moisture in the interspace. It was not possible to renew the paint and sealants on this window without removing the PG. The glass PG has held up well and is in excellent condition.

PG REMOVAL/ALTERATION REASONS:

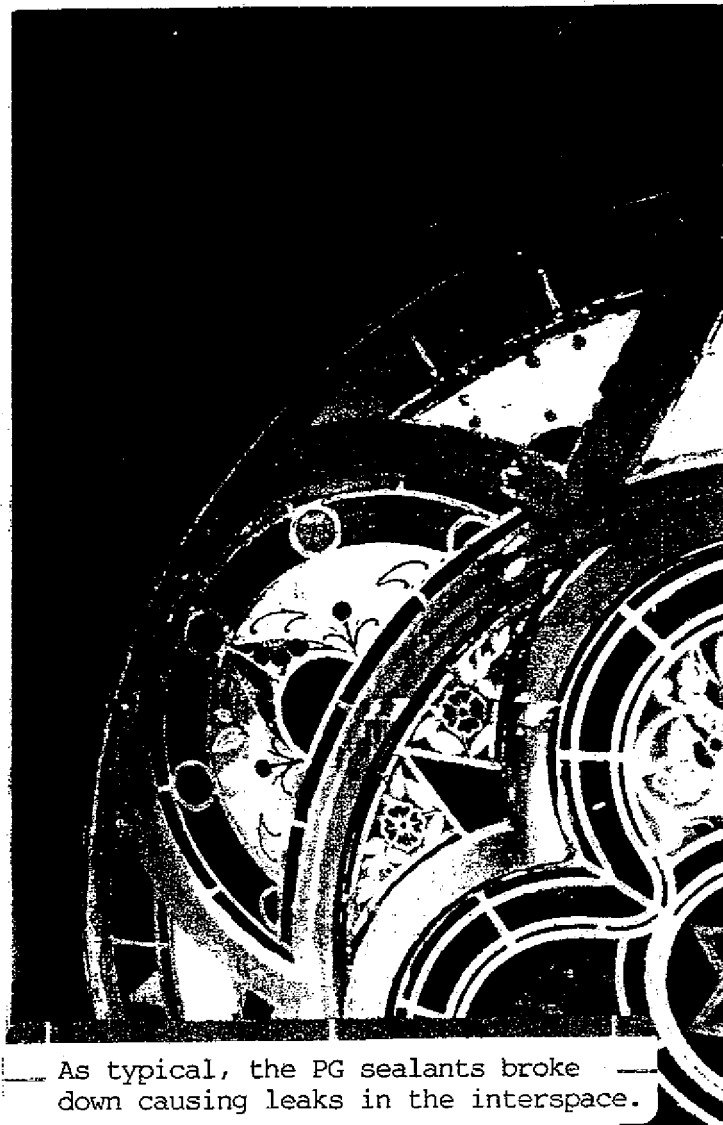
This window was included in the study to evaluate the oxidation of the lead comes. Only the new lead comes from 1974 are oxidizing while the original leading is so exhausted it could not be recemented. The church is preparing to restore the 1882 chapel and decided to address the unusual deterioration of the east windows. The PG grid which broke up the rose window tracery was undesirable and the church has elected to leave the PG off of the rose window after restoration. Although the church is located in a relatively low risk commercial area in terms of vandalism, there are security concerns. Therefore, the existing PG will be reinstalled on the lower arched window after the window has been cleaned and waterproofed. Methods of reinstalling the glass in a separate frame to perform ongoing maintenance will be evaluated and the re-installation will be vented.

FINAL RESULTS:

[The existing PG was removed from the rose window which will be restored; the existing PG on the lower arched window will be reinstalled with venting]. Test results indicate that sound transmission increased a few decibels while daylight was unaffected by removal of the clear, clean glass. Overcast skies prevented any testing of the surface temperature of the glass. As with many of the other case study windows, removing the PG revealed more deterioration of the window frame than the stained glass. These rotting conditions would have eventually jeopardized the structural integrity of the frame and possibly caused the window to collapse. Once again this proves that PG is a barrier to maintenance (see Case Study #10 photos and C25 in Appendix A).



The PG has already been removed from the rose window.



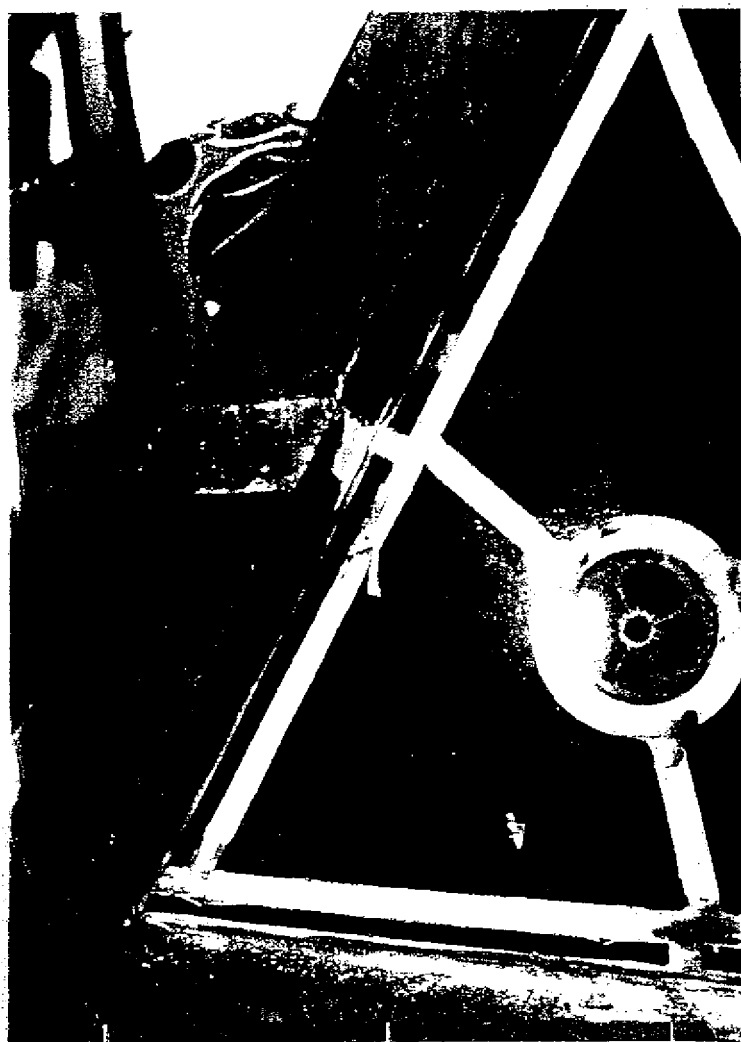
As typical, the PG sealants broke down causing leaks in the interspace.



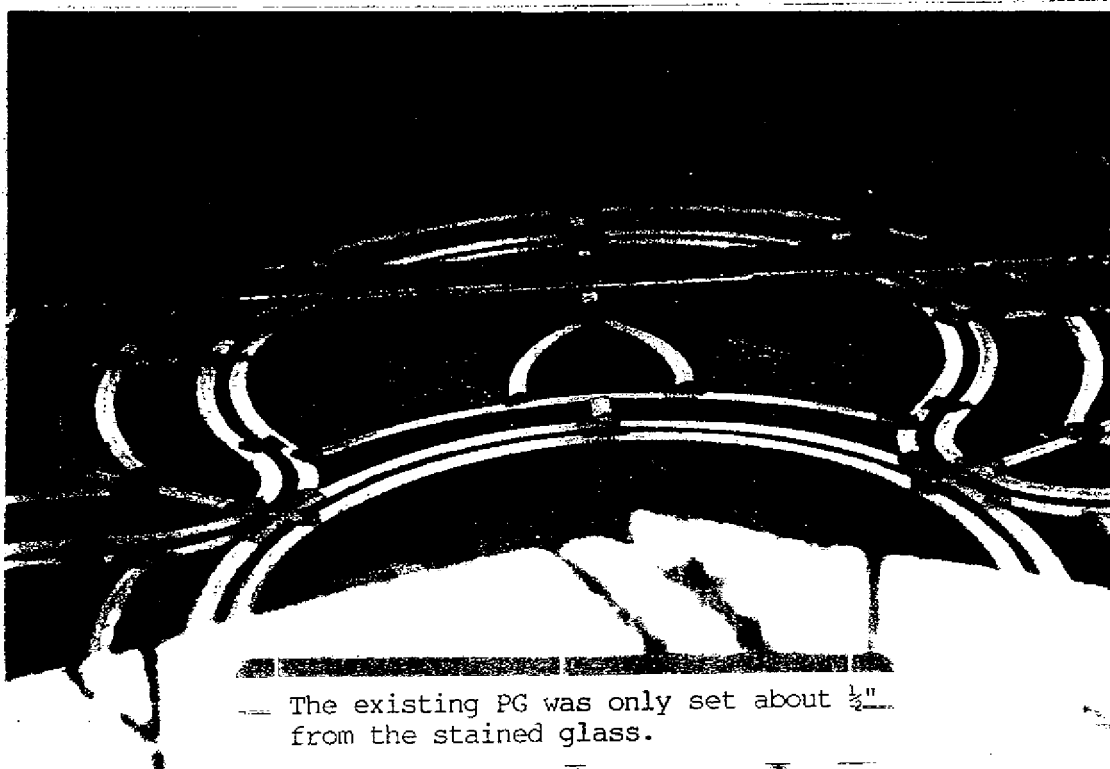
White lead carbonate from oxidation can be seen prior to cleaning.



Lead carbonate was peeling off the window from condensation.



Lead carbonate, faded paint, and rotting wood caused by condensation.



The existing PG was only set about $\frac{1}{2}$ " from the stained glass.